



Food and Agriculture Organization
of the United Nations

INTEGRATION OF NUTRITION IN AGRICULTURE EXTENSION SERVICES IN AFRICA

**A desk review of country case studies,
pre-service and in-service training materials**



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Edited by
Laouratou Dia
Mawuli Sablah
Mohamed Ag Bendeck

Food and Agriculture Organization of the United Nations
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FFS Impact on SLaM Adoption. Group dynamics exercise during FFS session at Kigina catchment in Rwanda (©FAO/Julianus Thomas)

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FAO's efforts continue to improve nutrition in Rural Rwanda (©FAO/Mutesi Teopista).

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Acronyms and abbreviations

ADA: Agricultural Development Army
APFS/PFS: Agro Pastoral Field School / Pastoral Field School
ATVET: Agricultural Technical and Vocational Education and Training
BCC: Behaviour Change Communication
BMEL: The Federal German Ministry of Food and Agriculture
CAADP: Comprehensive Africa Agricultural Development Programme
CIG: Common Interest Groups
CRESA: Regional Center of Specialized Education in Agriculture
CTA: The Technical Centre for Agricultural and Rural Cooperation
DA: Development Agent
DAES: Directorate of Agriculture Extension Service
DFID: United Kingdom Department for International Development
DO: District Office
EAS: Extension and Advisory Service
EAW: Extension and Advisory Worker
ENACT: Education for Effective Nutrition in Action
ENAF: Education for Effective Nutrition in Action in Francophone Africa
FAO: Food and Agriculture Organization of the United Nations
FAPD: Federation of the Agro Pastoralists of Djender
FASDP: Food and Agriculture Sector Development Policy
FBDG: Food Based Dietary Guidelines
FCT: Farmer Training Center
FFLS/JFFLS: Farmer Field and Life School / Junior Farmer Field and Life School FFS: Farmer Field School
FTC: Farmer Training Center
FYGTP: Five Year Growth and Transformational Plan
HDA: Health Development Army
HEP: Health Extension Programme
HEW: Health Extension Worker
HRMD: Human Resources Directorate
ICN-2: Second International Conference on Nutrition
ICT: Information and Communication Technologies
ILRI: International Livestock Research Institute
INGENAES: Integrated Gender and Nutrition within Agricultural Extension Service
IPM – FFS: Integrated Pest Management Farmer Field Schools
IRD/PUB: Institute of Rural Development / Polytechnic University of Bobo-Dioulasso
KNUST: Kwame Nkrumah University of Science and Technology
METASIP: Medium Term Agriculture Sector Investment Plan
MOARD: Ministry of Agriculture and Rural Development
MoFA: Ghana Ministry of Food and Agriculture
MoMS: Kenya Ministry of Medical Services
MoPHS: Kenya Ministry of Health and Sanitation
NAADS: National Agricultural Advisory Service
NAEP: National Agricultural Extension Policy
NALEP: National Agriculture and Livestock Extension Programme
NGO: Non-Governmental Organization
NNAP: National Nutrition Action Plan
PADETES: Participatory Demonstration and Training Extension System (PADETES)
PASDEP: Plan for Accelerated and Sustained Development to End Poverty
PMA: Plan for the Modernization of Agriculture
RELC: Research Linkage Committee
RIPAT: Rural Initiatives for Participatory Agricultural Transformation
SDG: Sustainable Development Goals

SOFA: State of Food and Agriculture
SRA: Strategy for Revitalizing Agriculture
UCC: University of Cape Coast
UDS: University of Development Studies
UoG: University of Ghana
VSF-B: Veterinaires Sans Frontieres – Belgium
WFP: World Food Programme
WHO: World Health Organization
WIAD: Women in Agriculture Development Directorate

ABSTRACT

Background: Linking agricultural extension and advisory service (EAS) with participatory learning and action on nutrition and health has the potential to improve the sustainability and impact of food and agricultural programmes on nutrition and household food security. Due to their established structure/network and their greater reach to the community of whom they often already have the trust, agricultural extension and advisory workers (EAW) are probably the best resource to help achieve nutrition security through nutrition education to farmers. In order to do so, the extension workers must receive nutrition and nutrition education training. This desk review aims at mapping how nutrition is currently being mainstreamed into agricultural EAS pre-service and in-service training and to give recommendation on the way forward.

Methodology: The study is based on a desk-review of peer-reviewed literature and grey literature. The integration of nutrition into the agricultural EAS materials was analysed by looking at five specific steps and key potential nutrition actions. The assessed steps were: i) problem identification; ii) audience and needs; iii) development of core messages; iv) message form and delivery; and v) evaluation. The key potential nutrition agriculture actions were: horticulture and crops; livestock and fisheries; food processing, fortification and storage; hygiene; consumption and gender sensitivity.

Results: According to the desk review agricultural extension and advisory service is in perpetual evolution. In the past, agricultural extension used to be provided mainly by public sector at central level for technology transfer from universities to the farmers. In the last decades, the approach has shifted from a one-way centralized model towards a more decentralized and pluralistic approach. Some studies have concluded that agricultural interventions can influence the underlying determinants of undernutrition to such an extent that they translate directly into children coming closer to their full growth potential. Regarding the integration of nutrition into agricultural EAS both within pre-service and in-service training, different approaches are being used. For the pre-service training, there are as many options of nutrition integration as there are agricultural extension programmes. Similarly, for the in-service training, there is no one specific model that fits all situations.

Recommendations: In order to mainstream nutrition into agricultural extension and advisory service at institutional level, it is crucial to create a supportive environment by garnering a strong political will and maximizing the opportunities through multi-sectoral coordination and implementation from other sectors that will work in synergies. It is also essential to approach agricultural EAS with a gender-sensitive lens and to promote the food system approach in agricultural learning institutions. At operational level, it would be important to identify the major nutritional problems and the main agro-ecosystem challenges, as well as to adopt an inclusive approach by involving the beneficiaries since the conception phas

INTRODUCTION

Building farmers' capacities through agricultural extension and advisory services (EAS) provides an excellent entry point for sharing nutrition knowledge and developing farmers' healthy nutrition attitudes and practices in a culturally appropriate manner. After years of neglect, there is now a renewed interest in agricultural extension and advisory services worldwide. This was echoed in the Second International Conference on Nutrition (ICN2) in 2014 and its Framework for Action which clearly insists on the importance of "building nutrition skills and capacity to undertake nutrition education activities, particularly for front line workers, social workers, agricultural extension personnel, teachers and health professionals". A growing number of studies emphasize the important role and potential of agricultural extension and advisory workers (EAW) in improving nutrition outcomes of agriculture interventions (Callens and Gallagher, 2003) (Suvedi and Kaplowitz, 2016).

Africa is facing complex nutrition problems and malnutrition remains an important public health issue. According to the recent Global Nutrition Report 2015 (www.globalnutritionreport.org) 36 countries in the continent are facing the conventional burdens of stunting in children under five and/or anaemia in women of reproductive age and 13 countries are facing the multiple burden of malnutrition (the coexistence of undernutrition and overweight simultaneously). Also, eight percent of adults are obese and this percentage is still increasing in all the countries of the region.

It is well documented today that causes of malnutrition are multifactorial. By addressing malnutrition underlying causes, many sectors have indirect consequences on nutrition: agriculture, education, health, social protection, and water, sanitation, and hygiene. In recent years, the interest in leveraging agriculture to improve nutritional outcomes has been amplified, especially at institutional level. Indeed, many international agencies and development institutions have issued reports highlighting the linkages between agriculture and nutrition. The ICN2 Framework for Action pointed to the substantial positive impacts these sectors can generate if they design policies and programmes that consider their effects on nutrition drivers. At operational and programmatic level, it has been established that to improve the chance that increases in staple crop production and purchasing power lead to accelerated reductions in malnutrition, agricultural development interventions must focus on nutrition security in addition to food security. Achieving nutrition security requires an adequately diversified diet in terms of macronutrients and micronutrients, as well as access to a healthy environment, an adequate health service system and proper care and feeding practices. While food security may increase the total quantity of energy available for consumption, nutrition security can guarantee the quality and diversity of food that is necessary for protecting and promoting good nutritional status and health (Thompson and Meerman, 2014).

In this regard, linking agricultural EAS with participatory learning and action on nutrition and health can potentially improve the sustainability and impact of food and agricultural programmes on nutrition and household food security (Callens and Gallagher, 2003). Extension agents are probably the best resource to help achieve nutrition security since they already have an established structure/network and they have a greater reach to the community of whom they already have the trust and they are also culturally aware of the specificity of the community.

Despite these advantages, the biggest challenges regarding agricultural EAS is the small number of workers available and their limited knowledge on nutrition topics.

The World Bank counts more than half billion official extension workers worldwide and about 90% are located in developing countries (Anderson, 2007). According to Sasakawa Global 2000, there are about 150 000 extension workers in Sub-Saharan Africa from the private, public, and civil society sector (Davis K. E., 2008).

In her study on Integrating Nutrition into Farmer Field School (FFS) in Eastern Africa, Kuria (2014) found that farmers had inadequate knowledge on the composition of a balanced diet and they also had little knowledge on the nutritive value of the foods they grew and consumed. This was attributed to the weak basic knowledge on nutrition among facilitators. Participants from Farmer Field and Life Schools in Rwanda and Uganda indicated that they were encouraged to consume what they produced in their kitchen gardens, farms, and households; however, they lacked knowledge on the nutrients that these foods contribute to the diet (Kuria, 2014). Therefore, it is important that agricultural EAW sensitize farmers on nutrition. In order to do so, the extension workers are yet to receive nutrition and nutrition education trainings.

At the time of this research, no publication focusing on reviewing the training of agricultural EAW was found. That is the reason why this study aims at sharing country experiences on the integration of nutrition into agricultural EAS and at reviewing training materials and curricula of agricultural EAS in the Africa region.

This review is divided into three main sections. The first section provides the background for understanding agricultural EAS and its evolution over the years: what it is? Who are the main actors? What is the role of an agricultural EAW? Who finance agricultural EAS work? Who implement it? How does EAS leverage food and nutrition security? This section includes also a short presentation of some country experiences. The second section presents the specific efforts made in Burkina Faso, Senegal, and Sierra Leone to mainstream nutrition into different agricultural extension and advisory models (pre-service and in-service training). The last section consists of the analysis of training materials from the region and their implementation: first, in-service training materials which are currently in use or which have been used previously in fourteen African countries (Burkina Faso, Burundi, the Democratic Republic of the Congo, Ethiopia, Kenya, Malawi, Mali, Mozambique, Namibia, the Niger, Senegal, Sierra Leone, Uganda and Zimbabwe) are analysed; lastly, the analysis will focus on the incorporation of nutrition courses into the curricula of agricultural extension and advisory programmes from nine different universities (Polytechnic University of Bobo-Dioulassa through Institut of Rural Development, Hawassa University, the agricultural colleges of the Human Resources Directorate, University of Cape Coast, University of Ghana, University of Development Studies, Kenyatta University and Michael Oporokara University) in six countries, (Burkina Faso, Ethiopia, Ghana, Kenya, the Niger and Nigeria).

1. PURPOSE AND OBJECTIVES

This review was created as a background paper for the integration of nutrition into agricultural EAS trainings (pre-service and in-service training) in Africa under the “Mainstreaming Nutrition in CAADP and Agriculture Policies and Programmes in Sub-Saharan Africa” project financed by the federal Government of Germany (BMEL).

The main objective of this desk review was to have an understanding of what already exists in terms of mainstreaming nutrition into agricultural EAS training for the pre-service and the in-service training, and to formulate key recommendations on how to move forward.

The specific objectives were to:

- (i) understand agricultural EAS and its evolution,
- (ii) share country experiences on the integration of nutrition into agricultural EAS
- (iii) review some agricultural EAS pre-service and in-service training materials
- (iv) formulate recommendations for nutrition integration into EAS training in Africa

2. METHODOLOGY

This review is a descriptive study based on a desk-review and lays the foundations for formulating recommendations to mainstream nutrition into agricultural EAS training. The desk review was supported by interviews with key informants, field missions (Burkina Faso and Senegal), curricula analysis for pre-service training and training materials for in-service training. These elements provided essential information to develop a report on the situation of nutrition integration into agricultural EAS in Africa and eventually support countries to develop training materials that takes into consideration the nutrition component.

2.1. Information sources

The methodology used for this comprehensive desk review consisted in a combination of peer-reviewed literature and grey literature. First of all, the FAO documents repository website¹ was consulted to identify relevant publications on the topic covered in the research. The search resulted in four relevant documents for the review. Then, specific organizations websites were visited such as: the Global Forum for Rural Advisory Service (www.g-fras.org), the International Food Policy Research Institute (www.ifpri.org), the United States Agency for International Development (www.usaid.gov), Feed the Future (www.feedthefuture.gov) and the World Bank (www.worldbank.org). This first-round search yielded 19 relevant publications. It is at this stage that literature online databases such as Pubmed, Agris and Google Scholar were consulted using the following key words: “agricultural extension service” or “agricultural advisory service” or “extension advisory service” or “rural advisory service”, or “rural extension” or “participatory extension”, and “nutrition” or “diet”. This second-round search yielded four additional publications were found relevant to this review.

Besides, a message was sent out on October 2015 to “Ag2Nut” Community of practice and “Feds” (Food educators) group to ask the members if they could share publications and training materials on integrating nutrition and nutrition education into agricultural extension services in Africa. This call for documents resulted in four additional publications.

Additional relevant publications were found by scanning reference list of publications that were primarily found in peer-reviewed literature and grey literature. Five more documents were found through this snow-balling process.

An online discussion on “integrating nutrition into the curricula of agriculture education institutions: Strengthening human capacity to promote nutrition-sensitive agriculture” was held on the Global Forum on Food Security and Nutrition (www.fao.org/fsnforum) from 10 to 27 November 2015. Over a three-week discussion, 36 contributions were shared by participants from 18 countries. The relevant contributions of participants were included in the present review.

¹ Available at: <http://www.fao.org/documents/en/#>

In addition to this, e-mails were sent to FAO nutrition focal points in Burkina Faso, Burundi, the Democratic Republic of the Congo, Ghana, Kenya, Mali, Nigeria and Sierra Leone from January to April 2016 to collect agricultural training manuals in use (or that were used) for agricultural extension agents. E-mails were also sent to universities that piloted the ENACT/ENAF² course to have access to their agricultural extension curricula.

Many more publications were consulted to enrich the content of the report, chosen on the basis of the following inclusion criteria:

- Focus on the Africa region;
- Published between 1990 and 2016;
- Related to agricultural extension and advisory service;
- Related to agricultural extension and advisory service and nutrition;
- Published in French and English.

2.2. Key definitions

The definitions used in this study are taken from the Integrated Gender and Nutrition within Agricultural Extension Services (INGENAES) project (box 2), a Feed the Future project which aims at strengthening gender and nutrition integration within agricultural extension and advisory services. The project gathered very detailed and strong definitions from the literature.

Anderson (2007) defines **agricultural extension and advisory services** as the entire set of organization that support and facilitate people engaged in agricultural production to solve problems and to obtain information, skills and technologies to improve their livelihoods (Anderson, 2007). This definition includes organizations from different governmental agencies (formerly the main actors in extension), non-governmental organizations (NGOs), producer organizations and other farmer organizations, and private sector actors including input suppliers, purchasers of agricultural products, training organizations, and media groups (Davis K. E., 2008).

“Rural advisory and extension services, are all the different activities that provide the information and services needed and demanded by farmers and other actors in rural settings to assist them in developing their own technical, organisational, and management skills and practices so as to improve their livelihoods and wellbeing.” (Christoplos, 2010)

² The ENACT course was prepared by FAO’s Nutrition Education and Consumer Awareness Division, with support from the German Federal Ministry for Food and Agriculture (BMEL). This course has been developed to introduce participants to the principles and practice of “education for effective nutrition in action” (ENACT). ENACT aims at promoting long-term improvements in diet through an active approach based on identified needs, with attention to social and environmental contexts, all relevant sectors and the whole food cycle (production, processing, marketing, consumption). The course materials and cases mostly relate to Africa but the broad principles and activities are relevant to any country which needs to upgrade capacity in this field. The course is pitched at undergraduate level; however, it is relevant all who have or will have the professional need to handle nutrition education in some form, such as students of nutrition in universities and medical schools, agriculturists, district nurses, health service managers, rural development or community workers, IEC specialists, NGO staff and teachers.

The ENAF course in nutrition education has been translated and adapted from the ENACT (Education for Effective Nutrition in Action) course, and capitalizes on the achievements of this project. Like ENACT, but in Francophone Africa, ENAF develops the ability to plan, implement and evaluate interventions in nutrition education and communication

“Agricultural Extension has been strictly defined as the application of scientific research, knowledge, and technologies to improve agricultural practices through farmer education”. (University of Illinois at Urbana-Champaign; University of California, Davis; University of Florida, Cultural Practice, 2016). In this report, the terms *extension services* and *advisory services* will be used interchangeably, but the term *agricultural extension and advisory service* (EAS) is preferred.

"Pre-Service training of agricultural extension workers refers to the education of the agricultural extension workers prior to their entry in duty. Pre-service training has been given limited attention and resources in most developing countries since the 1990s. In most countries, field extension workers obtain a two- or three-year diploma from a school of agriculture, which is normally a terminal educational qualification. These diploma-level programs typically consist of a cross-section of agricultural courses, including crop and livestock production, plus basic skills in extension methods using the “diffusion of innovations” framework, which primarily focuses on technology transfer to larger, commercially oriented farmers”. (University of Illinois at Urbana-Champaign; University of California, Davis; University of Florida, Cultural Practice, 2016).”

In service training targets, professional agricultural extension and advisory workers and allow them to receive training to improve their skills and adapt to new technologies, practices and methods in agricultural extension field. In-service training is important as it ensures that the knowledge and skills of the agricultural EAW already in the field stay up-to-date.

The table 1, below summarized key criteria of formal and non-formal education.

Table 1: Key elements of formal education and non-formal education

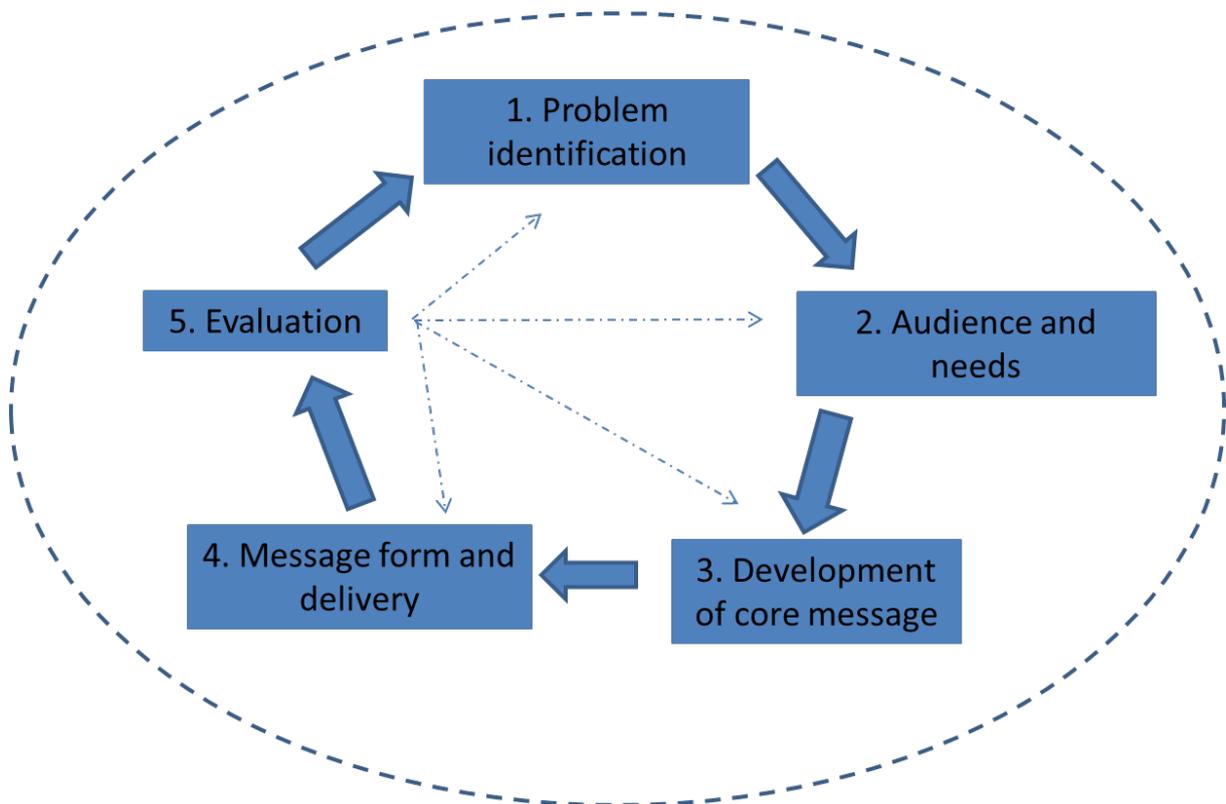
Formal Education	Non-Formal education
<ul style="list-style-type: none"> ▪ Teacher ▪ Teacher is at the center of the training ▪ "Supplier" of information (the teacher decides topics that will be taught to trainees). ▪ The teacher is responsible for the content of the program. ▪ Teachers determine in advance all sessions. ▪ The teacher is forced to be an "expert". ▪ The teacher gives a lecture to trainees. ▪ The students listen passively information 	<ul style="list-style-type: none"> ▪ Facilitator. ▪ Participants can bring contributions. ▪ " Information Finder " (target real information needs). ▪ The facilitator involves participants in identifying the learning objectives; he strives to pass them basic knowledge. ▪ Informal, free discussions and equal opportunities to participate. ▪ Cooperation and active collaboration of all participants. ▪ The facilitator is a member. ▪ The facilitator uses the contributions of the group. ▪ The group can answer questions a member of the group has raised (discussion / experience-sharing, implementation of testing, invitation of resource persons, etc.). ▪ Small group work. ▪ The facilitator stimulates critical thinking

Source: (FAO, 2014a)

2.3. Description of the conceptual framework for analysis

The information and materials collected were reviewed in the light of a conceptual framework that helped analyse and assess the training materials according to five specific steps and key potential nutrition actions. This framework was adapted from the five steps extension framework developed by the Modernizing Extension and Agricultural Service in collaboration with UC Davis Colleges of Agricultural and Environmental Sciences (Bell and Marcotte, 2013). The framework was selected as the most relevant to this study.

Figure 1 : Five steps extension framework



Source: Adapted from (Bell and Marcotte, Extension: Five Steps Extension Framework, 2013)

1. The first step on **problem identification** emphasizes the importance of conducting a formative research or a situation analysis on the agricultural, food and nutrition security practices and problems in the community. This analysis should be participatory and include all stakeholders of the community.
2. In the second step, the focus is on identifying **who** is the primary target group (and potentially who is the final beneficiary) of the training materials and what are their specific needs
3. Once the problems and the target audience with their needs have been identified, the third step is to know **what messages** should be developed as part of the solution to the problem.

In this regard, the REACH partnership has elaborated a compendium of **nutrition actions** to highlight potential nutrition actions in different sectors of the food systems. Some of the actions promoted were used in this study to assess the comprehensiveness of the training materials. Actions under “agriculture food and diet” and actions under “hygiene” were selected by the author as being most relevant to the work of agricultural extension workers. Below are the actions classified by category: Horticulture and crops, livestock and fisheries, food processing, fortification and storage, hygiene, consumption and gender sensitivity.

Horticulture/Crops

- Diversification and locally adapted varieties
- Indigenous wild food plants
- Bio fortification

Livestock and Fisheries

- Animal husbandry, fisheries and insect farming
- Animal services

Food Processing, Fortification and Storage

- Food processing (excluding fortification)
- Fortification (including salt iodization and complementary foods)
- Food storage
- Food waste and losses

Hygiene

- Hand-washing
- Household water treatment and storage
- Food hygiene
- Sanitation management

Consumption

- Improvement of local recipes
- Public guidance and consumer awareness/protection
- Complementary feeding

Gender sensitivity

- Labour and time saving technologies for women

4. **Message form and delivery** is the fourth step and refers to how appropriate and context-specific core message are delivered. Attention is given to adult non-formal education (table 1). This step was appreciated by the extend the manual was: (i) using an easy-to-understand VS. technical language, (ii) promoting a participatory VS. top-down approach (non-formal vs. formal education) and (iii) was using pluralistic method (e.g. field demonstration, community radio, video, training, etc.)
5. The fifth step, is the **evaluation** which allows the work to be iterative and improve the content (messages) as much as the message form and delivery of the training materials but also identify new agricultural and food and nutrition security problems as they arise. In this step a pre-testing of the training material is included.

2.4. Quantitative analysis

All the information and materials collected were analysed in the light of the framework outlined above. The in-service training materials were analysed according to the five steps framework and the key nutrition actions (horticulture and crops, livestock and fisheries, food processing, fortification and storage, hygiene, consumption and gender sensitivity) and the pre-service curricula were analysed according to the presence of nutrition courses in the curriculum.

For the in-service training materials, a coding system was used to determine which of the materials were more comprehensive based on the five steps framework. **Step 1** assessed identification of the material: whether materials were edited based on a formative research (score 1); or not (score 0). **Step 2**: whether a target group was identified (1) or not (0). **Step 3**: whether messages were covering all topics (Horticulture and crops, livestock and fisheries, food processing, fortification and storage, hygiene, consumption and gender-sensitivity) (1) or not (0). The topics could also be partially covered, in such case the variations would be as follow less than three topics (0.5) -; three topics (0.5); four topics (0.5) +; 5 topics (0.5) ++. **Step 4**: whether the training material was easy to understand (1) or not (0); the approach was participatory (1) or top-down (0); the material explained how to conduct non-formal education activities (1) (e.g. demonstration, role play, group dynamics, training, etc.) or not (0). Finally **Step 5**, was assessed by the fact that whether an evaluation and pre-testing of the material were conducted (1) or not (0).

To summarize:

- Step 1 – Problem identification: yes (1) or no (0)
- Step 2 – Target audience: yes (1) or no (0)
- Step 3 – Message content: everything (1), partially (0.5)-, (0.5), (0.5) +, (0.5) ++, or no (0)
- Step 4 – Message form and delivery:
 - Easy to understand (1) or technical (0)
 - Participatory (1) or top-down (0)
 - Explanations on how to conduct non-formal education activities (1) or no (0)
- Step 5 – Evaluation: yes (1) or no (0)
 - Pre-testing: yes (1) or no (0)

Then, based on the scores obtained, the agricultural EAS in-service training materials were classified on a scale from more nutrition-sensitive to the less nutrition-sensitive.

Regarding the agricultural EAS pre-service training, scores were given based on the presence of food security, nutrition/malnutrition and nutrition education courses. There were three possible scenarios: scenario 1, had at least the three courses or two out of the three; scenario 2, had at least one of the courses; and scenario 3, had none of the courses mentioned.

Scenario 1: food security and human nutrition or home economics and nutrition education course (score 1)

Scenario 2: food security or human nutrition or home economics or nutrition education course (0.5)

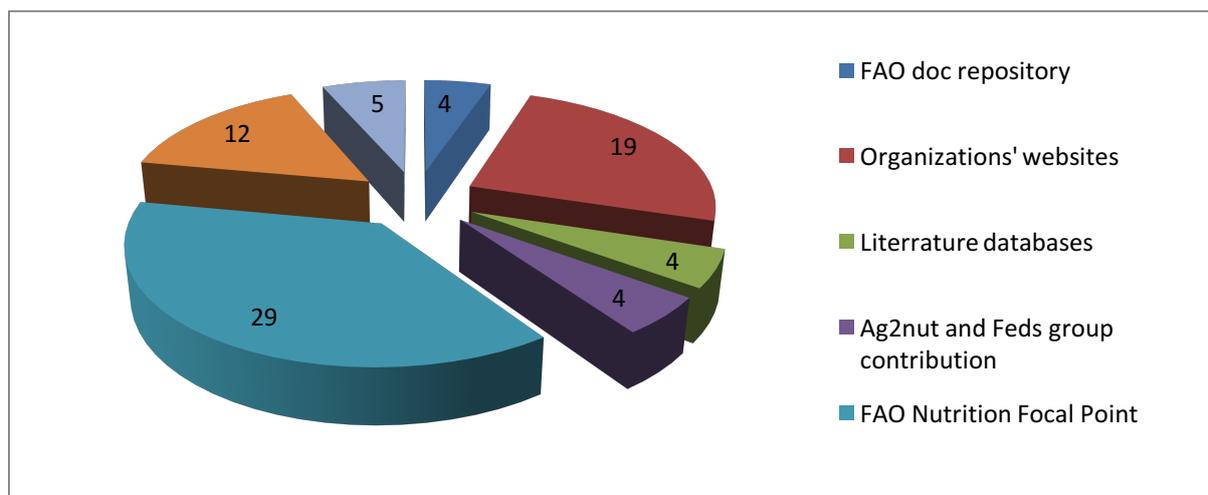
Scenario 3: none of the course (0)

All data were compiled and analysed with the coding in an Excel file. The results of the analysis were then translated into Word for the descriptive analysis.

3. KEY FINDINGS ON THE EVOLUTION OF AGRICULTURE EXTENSION AND ADVISORY SERVICES (EAS) PRACTICES IN AFRICA

The 77 publications reviewed are summarized in Figure 2. Section 3, mainly focuses on agreeing on a common understanding of agricultural extension and advisory services, its evolution throughout time and the role that it plays at leveraging nutrition. The background documents consulted contributed to put together some short countries experiences and to document the main challenges and opportunities to mainstream nutrition into agricultural EAS.

Figure 2 : Distribution of literature according to their origin



3.1. Summary of selected school of thoughts on agricultural EAS

According to Swanson (2008), the term *extension* was first used in England in the second half of the nineteenth century for adult education programmes that extended the work of universities beyond the campus. The term was then adopted in the United States including a research component. In the twenties of the twentieth century, when transferring the extension activities to the Ministry of Agriculture in Great-Britain, the term changed to *advisory services*. In the developing world, both terms are in use, but because most of the extension systems in sub-Saharan Africa are connected with the Ministry of Agriculture, the term advisory service is more common (Swanson, 2008).

Finding a definition for agricultural extensions and advisory service that is unanimously accepted and valid over time is quite challenging. The views of what extension and advisory service are, are changing and will continue to change and evolve throughout the agricultural development process of each country (Swanson, 2008). There are as many definitions as there are approaches and philosophies on agricultural extensions and advisory services (Anderson, 2007).

Regarding the objectives of agricultural EAS, Davis (2008) points out that extension was conceived to extend research-based knowledge to rural sector to improve the lives of the farmers. Then, it included component of technology transfer, broader rural development goals, management skills and non-formal education (Davis K. E., 2008). Swanson goes in the same

direction, but puts more emphasis on food security and the inclusion of the following skills and knowledge components: (i) transfer technologies; (ii) enhance the skills and knowledge (i.e. human capital); (iii) improve rural livelihoods and achieve household food security; (iv) and strengthening natural resource management in each country (Swanson, 2008).

3.1.1. Evolution of agricultural EAS models: most common standardized EAS models and concepts

At the beginning, agricultural extension and advisory services were using standardized models such as: **The Integrated Rural Development Project (IRDP)**, **The Training and Visits System (T&V)**, **The Farmer Field Schools (FFS)** - including **The Agro-Pastoral / Pastoral Field Schools (PFS)** and **The Junior Farmer Field and Life Schools (JFFLS)**. Current trends in agricultural extension are evolving from centralized public extension programmes to more decentralized, outsourced and demand-driven programmes. Birner (2006) distinguishes three major characteristics common to the new approaches: (i) the governance structure, with the role of the public, the private and the third sector in providing and financing the service; (ii) the financial and human capacity and management; and (iii) the extension and advisory methods (Birner *et al.*, 2006). The following section will give a brief overview of the most common EAS models, explaining the new different approaches.

Training and visit (T&V) extension system

The T&V extension concept was first developed and implemented in the nineteen-seventies as a component in two regional irrigation projects in Turkey and India. It became a widely promoted concept by the World Bank, and was implemented in more than 50 countries between 1975 and 1998 (Anderson, Feder, and Ganguly, 2006). The purpose of the T&V model is to “induce farmers to increase production of specified crops and the success is measured in terms of production increases of the particular crops covered by the programme”. The model has been criticized for lack of flexibility, top-down system of organisation (Engle and Stone, 1990) and a high cost of the implementation (Davis K. E., 2008). This was mainly associated with hierarchical organization due to several layers of management, a rigid visit schedule and fortnightly regular trainings of village level workers, concentration on the most important crops, and messages about relatively simple low-cost improved practices (Anderson, Feder, and Ganguly, 2006). Despite the yield increases, the program was not sustainable, and left many countries saddled with huge debts (Davis K. E., 2008).

Farmer Field School (FFS)

The first FFSs emerged in 1989 in the rice fields of Indonesia and the Philippines when farmers were abusing of highly toxic pesticides promoted by private industry and government to increase yields. In order to respond to the mis-utilization and over-utilization of pesticide that ultimately lead the pest species to become more resistant, the Integrated Pest Management Farmer Field Schools (IPM-FFS) were developed (Braun and Duveskog, 2008) to provide training in more sustainable farming methods to farmers. Farmer field schools were introduced into Sub-Saharan African in the mid-nineteen-nineties. As of today, the model is implemented in more than 90 countries and is no longer restricted to IPM, but encompasses a wider array of areas related to farming and rural livelihoods such as: food security, water and soil

management, dairy and poultry management, and organic agriculture, etc. (Callens and Gallagher, 2003) (FAO, 2016) (figure 5).

Figure 3 : Evolution of the farmer field school approach



Source: (FAO, 2016)

FFS are a participatory method of learning, based on adult-learning principles such as experiential learning (Table 1). The interactive and practical approach was developed as an alternative to the past conventional top-down T&V extension approach (Davis K. E., 2008) (Kuria, 2014). FFS consist of a group of farmers with common interest (usually a group between 20 to 30 farmers) who engage in a season-long study program with weekly meetings to experiment on the field varied topics (conservation, crop husbandry, animal husbandry, land husbandry, income generating activities, ecology, etc.). The group is responsible from the crop management to the harvest and post-harvest. “The field is the teacher” providing most of the training materials like plants, pests, etc. FFS describes well the learning-by-doing approach (Sustainet EA, 2010).

Callens and Gallagher (2003) describe how each of the weekly meetings are organized. The meetings are usually divided in two main sections. The first section is focusing on field analysis, where the group makes structured observations of their crop and analyses the situation using an “agro-ecosystem analysis” method and discusses it until a consensus on required management is reached. In this section, farmers are facilitated to conduct their own research, diagnose and test problems, and come up with their own solutions. The second section concentrates on “special topics” and deals with group dynamics, and another topic chosen by farmers themselves on issues such as pest, disease, etc. (Callens and Gallagher, 2003). It is

essential for the FFS approach that the farmers are at the centre and the facilitators are only providing guidance when needed and ensure that the meetings are conducted properly.

FFS have shown remarkable impact in terms of pesticide reduction, increases in productivity, knowledge gain among farmers, and empowerment. Some studies however have called into question their overall impact and financial sustainability (Davis K. E., 2008). Indeed, the cost of an FFS vary depending on the facilitator's travel costs. The cost could be as little as US\$50 for a season if the facilitators live nearby, while others could cost as much as US\$500 because the facilitators live far away (Callens and Gallagher, 2003).

Regarding the integration of nutrition into FFS, Callens and Gallagher (2010) think that there is still a need for a stronger incorporation by linking crop choice and diversification to food consumption, nutritional needs and dietary practices within local communities. There is also need to promote indigenous foods which have agronomic potential and nutritional benefits but are neglected by the community. Improving the production or domestication of wild varieties is a low-cost option for improving the nutrition and health of poor households, which could be supported by the FFS (Callens and Gallagher, 2003).

Agro-Pastoral Field Schools (APFS) and Pastoral Field Schools (PFS)

Agro-pastoral field schools and pastoral field schools are a variant of the FFS adapted to the agro-pastoralist and pastoralist contexts. In 2001, the International Livestock Research Institute (ILRI) with FAO and the UK's Department for International Development (DFID) applied the FFS methodology to livestock production systems in Kenya, focusing on smallholder dairy and extensive mixed farming system. The PFS model, was then extended by ILRI and Veterinaires Sans Frontieres – Belgium (VSF-B) in the arid and semi-arid parts of Turkana District in Kenya. As of today, the PFS model is implemented in Kenya, Uganda, Ethiopia, Somalia, the Sudan, Djibouti and in the west Africa region. The aim of PFS is similar to the FFS: "improve the decision-making capacity of participants and their wider communities and to stimulate local innovation" (FAO, 2013). The main difference is on the duration of the PFS cycle, which last longer: about one and a half year or two years. It covers the period before, during and after the dry season in order to assess the group coping mechanism at different season. (FAO, 2013).

Food and nutrition security remains a huge challenge in the semi-arid north-western region of Kenya. Pastoral field schools can contribute to reduce vulnerability by providing platforms for discussions and assisting members in identifying local solutions. The village community bank (VICOBA) is a community bank that was set-up by the PFS group to improve the livelihoods of communities and build resilience. Thanks to the VICOBA, Elizabeth, a member of the Turkana PFS was able to make KS10 000 (USD 97.08) that she invested in her business and now she can afford to "buy meat, sugar, vegetable or milk to feed (her) family and meet other basic needs in (her) house" (Kimani, 2013a).

There is a need to mainstream nutrition in PFS context which are usually in arid or semi-arid area. As of today, there is very little literature available on the integration of nutrition component in PFS.

Farmer Field and Life Schools (FFLS) and Junior Farmer Field and Life Schools (JFFLS)

Both farmer field and life schools and junior farmer field and life schools are an adaptation of the FFS, emphasizing more on learning life skills.

The FFLS was developed in the early 1990s in Cambodia to tackle the rapid spread of HIV. It is a platform where adult farmers discuss problems they have regarding their livelihoods groups. They identify the fundamental causes of the problems and come up with solutions to tackle them. The curriculum of FFLS commonly addresses gender issues, gender based violence, human health, HIV and AIDs, and conflict management, as special life skills topics. Nutrition has been among the topics and has been emphasized as a key area of learning (Kuria, 2014)

FAO first endorsed the Junior farmer field and life schools with WFP and other development partners in some African countries in the 1990s, as a response to the growing number of children orphaned by AIDS. The purpose of these JFFLSs was to improve the livelihoods of the orphaned and other vulnerable children, empower them and provide them with opportunities for the future. There is equal number of girls and boys participating to the JFFLS and they are between 12 and 18 years old. The school focuses on teaching local agricultural production skills in order to help perpetuate the tradition, since their parents passed away at a very early stage. FFLS are structured in a way that links the discussed agricultural topics with life skills. For instance, when discussing small livestock diseases or plant diseases prevention, the link is made with the importance of taking care of its own health to prevent diseases, or when addressing crops life cycle link it to human nutrition through life cycle. Topics such as: field preparation, sowing and transplanting, weeding, irrigation, pest control, use and conservation of available resources, use and processing of food crops, harvesting, storage and marketing skills are covered in the agriculture component. Some topics of the life component include: HIV/AIDS awareness and prevention, gender sensitivity, child protection, psycho-social support, nutrition education and business skills. FFLS is guided by six key principles: (i) Child protection and security, (ii) gender-equal attitudes, (iii) participation, (iv) addressing vulnerability, (v) removing stigma and discrimination, and (vi) Right to food (FAO, 2007a).

In this model, the linkages with nutrition security usually fits into the life component. Issues around hygiene, health care practices can easily be raised and discussed. In her presentation on mainstreaming nutrition in farmer and pastoral field schools made during the CAADP Nutrition meeting for East Africa, Kimani (2013) highlighted some activities that were done in JFFLS, mentioning: small-scale farming, small enterprise (e.g. school canteen), cooking sessions and animal rearing (rabbits, goats, chicken) (Kimani, 2013b).

3.1.2. The shift in approach: from an agricultural focused public extension to a more decentralized, demand-driven and pluralistic model

In the past, agricultural extension used to be provided mainly by public sector at central level for technology transfer from universities to the farmers. In the last decades, the approach has shifted from a one-way centralized model towards a more decentralized and pluralistic approach. More recent approaches include decentralization to lower levels of government,

involvement of farmers' associations and non-governmental organizations, contracting-out of extension services, public-private partnerships, and privatization. The content of the agricultural EAS has also widened beyond technology transfer. This section will briefly describe the new approaches of agricultural extension and advisory service.

First, **Decentralized Extension** preserves the public delivery and funding characteristics of traditional centralized extension, but transfers the responsibility for delivery to local governments (district, county, etc.) in diverse ways (Anderson, 2007). According to the INGENAES's EAS terminology and glossary, decentralized extension is defined by three major elements:

- (i) **“transferring specific decision-making functions to local levels**, starting with simple managerial functions, then setting priorities and allocating funds and providing other administrative functions, including accountability and financing/co-financing;
- (ii) **encouraging public participation**, reflecting the degree of authority that is formally transferred to rural people, starting in an advisory capacity for program planning and implementation, and eventually assuming control over selected financial planning and accountability functions;
- (iii) **expanding local involvement in organizing and delivering extension services**, be it through local government actors, private firms or non-governmental organizations” (University of Illinois at Urbana-Champaign; University of California, Davis; University of Florida, Cultural Practice, 2016).

Second, the **Fee-for-Service** or **Contracting-Out** or **Outsourcing Extension** materializes the idea that the government should play a “facilitating role” instead of engaging itself in delivery frontline services (Anderson, 2007). Usually, in this model small groups of farmers typically contract for specific extension services to address their needs and the public sector (or any other sector: a non-governmental organization, a private-sector firm, or even a consultant) provides the extension and advisory services. Depending on the type of contract, the provider may be from public or private-sector, NGOs or a consultant. By paying for the extension services, the contractor (the group of farmers) is free to agree on the desired programs and program scale (Davis K. E., 2008). This market model of extension may prevent some common problems associated with agricultural EAS, such as free-rider problems and non-rivalry in information use because the public good is defined at the level of the farmers' group, and the costs are shared by the whole group (Anderson, 2007). In order to ensure that poor farmers and marginalized groups –who can't afford “buying” extension services - are not excluded, Anderson (2007) recommends government voucher systems; even though, empirical evidence in using this approach is mixed (Anderson, 2007). Experience in Mozambique and Ireland however shows that shifting the cost of extension services directly to commercial farmers must be done incrementally over the year, especially pending evaluative processes (University of Illinois at Urbana-Champaign; University of California, Davis; University of Florida, Cultural Practice, 2016).

Third, the **Participatory Extension** approach reflects the idea that farmers already have skills in food production, but can learn more from each other to update and to develop new skills for improving their quality of life. In this approach, an active participation by farmers themselves is expected. It is important that all types of farmers, especially small-scale and women farmers play a key role in setting extension priorities and shaping the extension programs. Active

participation is also encouraged to reinforce group learning and group action, which is essential for increasing the “ownership” over the extension activities. In this approach, the agricultural EAW plays the role of a facilitator and creates an interactive exchange platform by including several stakeholders (e.g. public sector, private-sector firms, non-governmental organizations, and/or innovative and progressive farmers, etc.) to the extension and advisory services. Participants are expected to make their own decisions at the end of the group meetings, demonstrations, individual and group travel, and local sharing of appropriate technologies. To overcome the hindrances of participation and to get the voices of the vulnerable groups, the quality of facilitation is essential. The success of this approach is measured in numbers of farmers actively participating, and the continuity of the programme (Engle and Stone, 1990).

The **Demand-driven Extension** approach brings out the idea that farmers know best their own needs. Therefore, extension programmes should be based on their explicitly expressed needs, and not based on their needs as perceived or identified by the EAW or any other stakeholders (i.e. supply-driven extension). Demand-driven approach implies that farmers need to be part of the planning exercise and the extension and advisory plans must be provided in line with their demands. The demand-driven is a process to empower the farmers and makes service-providers accountable to them (Rivera and Alex, 2004). The principles of demand-driven extension summarized what has been said above:

- services shall be driven by user demand,
- service providers shall be accountable to the users,
- users shall have a free choice of service providers (Sanne Chipeta, 2006).

Finally, the **Pluralistic Extension** approach refers to the various options that are available to farmers and provided by different combination of actors over different themes. Farmers have the opportunity to choose the most appropriate extension and advisory service for their needs among a combination of options. Actually, the public, the private and the NGOs sector can be involved in different combinations to provide and finance extension and advisory services to better fit farmers’ needs. Knowing which combination is most suitable for a given situation depends on a number of conditions, such as: the type of farming system, the socioeconomic situation, and the government’s capacity (Birner *et al.*, 2006). “When pluralistic systems work well, they are well equipped to deal with the diversity of conditions, needs, audiences, and farming systems that make up the agricultural landscape by providing an equally diverse array of services and service providers” (University of Illinois at Urbana-Champaign; University of California, Davis; University of Florida, Cultural Practice, 2016). Due to its complex structure, the major challenges that the pluralistic model has to face is related to evaluation and accountability (Birner *et al.*, 2006).

The table 2, illustrates the different options for service provider and funding.

Table 2 : Options for providing and financing pluralistic agricultural advisory service

Source of Finance for the Service					
Provider of the service	Public sector	Private sector: Farmers	Private sector: Companies	Third sector: NGOs	Third sector: FBOs
Public sector	(1) Public sector advisory services, no fees different degrees of decentralization	(5) Fee-based public sector advisory services	(9) Private companies contract staff from public sector advisory services	(12) NGOs contract staff from public sector advisory services	(16) FBOs contract staff from public sector advisory services
Private sector: Companies	(2) Publicly funded contracts to private service providers	(6) Private sector companies providing fee-based advisory services	(10) Embedded services: Companies provide information with input sale or marketing of products	(13) NGOs contract staff from private service providers	(17) FBOs contract staff from private service providers
Third sector: Non-governmental organizations (NGOs)	(3) Publicly funded contracts to NGO providers	(7) Advisory services agents hired by NGO, farmers pay fees	(11) Private companies contract NGO staff to provide advisory services	(14) NGOs hire own advisory staff and provide service free of charge	
Third sector: Farmer-based organizations (FBOs)	(4) Publicly funded contracts to FBO providers	(8) Advisory service staff hired by FBO, farmers pay fees		(15) NGOs fund advisory service staff who are employed by FBOs	(18) FBOs hire own advisory staff and provide service free to members

Source: (Birner *et al.*, 2006)

3.1.3. Expanding the reach of agricultural extension and advisory service messages: the role of ICT

The Information and Communication Technologies (ICT) play an increasingly important role in agricultural extension and advisory services. Although ICTs are used in extension in countries such as China, India, and Chile, Africa has lagged behind in harnessing ICT potential for extension and other rural development issues (Davis K. E., 2008).

According to Bell (2006) in his paper on linkages between ICT and behaviour change in agricultural EAS, he stated that among the several challenges that farmers face, access to credit, access to better market prices, and access to credible and relevant information are often identified as the three most important problems (Bell, 2016). Especially access to information has received increasing attention. Reaching communities with the limited number of agricultural extension and advisory workers and the limited transportation resource they have is a real challenge. As a result, some farmers may rarely, if ever, see an extension worker (Fanzo *et al.*, 2013). That's where ICT can expand the reach of agricultural extension and advisory messages. "ICT has already shown to have the capacity to dramatically expand communication and improve access to information (and facilitate monetary transfers)" (Bell, 2016). Bell, developed the "AID model" which summarized the key principles for promoting behaviour change through ICT. This model is based on theories from the business sector (especially marketing), and the health sector (Alive and Thrive programme), but also from practitioners from the business and agriculture world. It analyses various factors associated

with the introduction of behaviour change across area of health, business and agriculture EAS. The model is defined as follow:

1. **Aware** - Do people know about the information?

Be clear on the target audience, define their needs and interests and know how to reach them

2. **Interested** - Do people care and want to learn more about the information?

Be connected to the target audience to catch their interests, build trust and be responsive to their feedback.

3. **Doable** - Can people easily take actions, based on the information, if they want to?

Provide true, feasible and realistic information to the target audience to give them the chance to easily test the product.

Figure 4 : The AID model



Source: (Bell, 2016)

Bell also gives three other additional factors for success:

- (i) flexibility and agility;
- (ii) competent teams
- (iii) acceptable upfront costs if wanting to sell a service.

Acceptable upfront costs if wanting to sell a service refer to people willingness to pay a service as they go rather than upfront. The example given was the fact that customers were hesitant to pay for an on-line game up front, but they are more inclined to pay while playing the game (playing to unlock some part of the game, or service to speed up the game, etc.).

The table below show how ICT can better encourage behaviour change through each of the three steps of the AID model.

Table 3 : General considerations in the use of ICT in the AID model

“AID” Model Factors	ICT options and considerations
A Awareness. Do people know about your information?	
<p>Be clear on your target audience.</p> <p>Use a diverse and relevant range of communication channels to make sure your audience(s) is readily aware of your product/service.</p>	<p>ICT (especially the web) dramatically expands potential reach and access. However, promotion through multiple channels is typically needed so the audience knows the resource exists!</p> <p>How can ICT better help identify the audience in need and their interest?</p> <p>White “Push” SMS are often promoted to directly reach the farmer, risk of being viewed as spam is an issue.</p> <p>Example pf application: Farm Radio International works with established, trusted programs and so quickly gains access to a wide audience.</p>
I Interest. Do people want to learn more?	
<p>Provide proven information that addresses specific needs and interest of the audience.</p> <p>Become or work with a trusted source of information (credible proven content).</p> <p>Have your message appeal at an aspirational (emotional) level.</p> <p>Build in feedback to respond to emerging needs and audience responses to your information.</p>	<p>ICT (especially the use of video and visuals) dramatically expands the potential to build both trust and an emotional connection with the audience.</p> <p>Example of application: Digital Green (DG) and Shamba Shape-Up (SSU) feature people “just like me” so the audience can easily relate to them.</p> <p>Mobile based GPS systems allow real-time, in the field feedback.</p> <p>Example of application: DG and SSU have feedback mechanism to quickly collect and monitor feedback and so adapt their message and approach to better connect with their audiences.</p> <p>Two-way communication, especially interaction through cell phones, helps build trust.</p> <p>Example of application: Farm Radio International</p> <p>Note. While ICT is powerful, farmers often want to see information field validated in their regions.</p>
D Doable. Do people want to try it?	
<p>Provide information that is easy to apply and has obvious benefit.</p> <p>Provide information which can be easily understood and tested.</p>	<p>Interactivity on a web site enhances learning for ease of implementation, but connectivity can be a limiting factor.</p> <p>The use of video and other visuals presents powerful ways to deliver information so potential users can easily see what the end product looks like and make implementation easy.</p> <p>Example of application: The proliferation of “how to” videos on Youtube. Also DG and SSU use their videos to show how farmers can quickly and effectively implement a practice. Their messages are backed up with instructions through other media.</p>

Source: (Bell, 2016)

The 6th Consultative meeting of the Technical Centre for Agricultural and Rural Cooperation’s (CTA)³ observatory on ICTs, discussed the main issues, developments and trends in agricultural EAS related to ICTs with special emphasis on improving rural livelihoods. According to the CTA’s consultative expert meeting, the end goal of ICTs interventions is not to improve agricultural production or postharvest activities per se; but rather “to contribute to

³ The Technical Centre for Agricultural and Rural Cooperation (CTA) is a joint international institution of the African, Caribbean and Pacific (ACP) Group of States and the European Union (EU). Its mission is to advance food and nutritional security, increase prosperity and encourage sound natural resource management in ACP countries. To know more on CTA consult the website: <http://www.cta.int/en/>

poverty reduction in the context of improved livelihoods, recognising the clear importance of the rural family as the hub of agricultural production in areas of poverty, and within national economies.” (Richardson, 2006). During this meeting seven issues for ICTs role in improving rural livelihoods were highlighted : (i) improving universal access to telecommunications policies and programmes by empowering rural and agricultural stakeholder organisations so that they can participate in advocacy efforts on behalf of rural people; (ii) rural credit and rural financial services – improvements in access, reach and flexibility; (iii) louder rural and agricultural stakeholder voices yielding improved access to decision-makers to influence policies, regulations and procedures that have a direct impact on rural livelihoods; (iv) more informed rural people and farmers who can use information to make relevant decisions about livelihood strategies, thereby reducing disaster impact (flood, disease, drought warning and mitigation), and increasing income diversification; (v) improvements in efficiency and effectiveness of rural service delivery across areas of health, education, agricultural extension, training and knowledge resources (vi) improved ICT planning capacities among civil society organisations – to plan, implement and integrate ICTs into their overall services; and (vii) application of ICTs in land surveys and registration systems for more efficient recording of land titles, and registration and transfer of land holdings (Richardson, 2006).

3.1.4. Integration of Women in agricultural EAS

Women play an important role in agriculture and nutrition. According to FAO (2011) they comprise “on average 43% of the agricultural labour force in developing countries, ranging from 20% in Latin America to 50% in Eastern Asia and Sub-Saharan Africa” (FAO, 2011). Women and men are involved in different aspects of the value chain with women contributing between 25% and 75% of the productive labour. However, their access to agricultural inputs, to lands and to extension and advisory services is limited compared to men (Colverson, 2015). According to the State of Food and Agriculture (SOFA) 2011, FAO estimates that “reducing gender inequalities in access to productive resources and services could increase yields on farms by 20–30 % which could raise total agricultural output in developing countries by 2.5 – 4 % and contribute to reducing the number of hungry people in the world by 12 – 17%” (FAO, 2011). From a business perspective, addressing gender inequalities in EAS increases skills and productivity and as a result it creates a sustainable flow of quality goods and new business opportunities. From a development perspective, closing the gender gap could contribute to strengthening food security, nutrition and to poverty reduction, to remove discrimination and to improve household nutrition (Manfre, Rubin, Allen, Summerfield, Colverson, and Akeredolu, 2013).

Manfre, Rubin, Allen, Summerfield, Colverson and Akeredolu (2013) list five aspects to take into consideration for making agricultural EAS “best fit” the needs of both male and female farmers:

- i. Defining the **target audience** of agricultural EAS. Understand how households and communities function in order to know who to consider as a farmer and identify who should receive EAS: Is it the head of household? the land owner or the income earner or the one who call himself/herself a farmer?
- ii. **Extension techniques and advisory methods** – The selection of a right channel to use to provide extension and advisory service is critical, because it may contribute to

marginalizing one group in favour of the other. Planning the right extension and advisory services interventions (individual visits, group visits, food demonstration, meetings, FFS and ICTs) is important to reach different type of farmers. Also, considering the time and mobility constraint as well as the education and literacy level of certain groups could help reaching more beneficiaries.

- iii. **Human resources for EAS** – The presence of women extension agents seem to increase female participation in extension activities. This calls for recruiting more female extension agents. According to Manfre *et al.* (2013) gender sensitivity of the agricultural EAS could also be increased by in-service training to equip extension agents to design gender-responsive participatory activities and by using adapted strategies such as labor and time saving technologies.
- iv. **Policy and enabling environment for gender** – Strong political commitment contributes to mainstream gender and to change organizational culture, goals and patterns of resource allocation.
- v. **Performance and impact** – Sex-disaggregated indicators need to capture the multiple level of outcome and impact (both individual and household level) In order to measure women's participation and the quality of extension and advisory services they receive. And to know if the EAS meet their needs whether it has the chance to lead to a positive gender-balanced change in farming practices and household food and nutrition security.

Colverson (2015) emphasizes the importance of understanding the gender context of agricultural EAS. He recommends posing simple questions and emphasizes on the importance of considering the 'six W's': Who is present or who is not present? Who does what? What are they doing? When are they doing it? Where are they doing it? Why are they doing it or not doing it?

The box 1, presents potential entry points for a gender-sensitive collaboration among stakeholders.

Box 1 : Principles for Gender-Equitable EAS

These principles provide guidelines for designing demand-driven and gender-equitable EAS services. This list presents potential entry points for collaboration among farmers, service providers, donors, and policy-makers in the building of a more equitable EAS system. Beyond this, specific actions will need to be designed based on assessment of the local socio-cultural context, and in consultation with farmers.

- **Increase the proportion of women extension officers.** No single strategy is likely to produce the desired results; a combination may be needed. The use of ICTs in extension services may offer new opportunities.
- **Equip all extension officers with the knowledge and skills to address men and women farmers equitably.** To reach more women producers and entrepreneurs, male and female extension agents should be equally responsible for and capable of reaching both men and women farmers (although in some places local cultural norms permit same-sex contacts only).
- **Adapt gender-responsive techniques and methods to the local context.** Appropriate methods for reaching men and women farmers equitably will differ between and within countries. EAS providers need to be prepared to choose methods based on local gender and social norms that influence women's time, mobility, and education.
- **Deliver cross-sectorial programming.** It is equally important to support collaborative household strategies between men and women. Programs that link agricultural extension with nutrition and health education or microcredit opportunities, for example, can be very effective.
- **Collect sex-disaggregated data.** The lack of sex-disaggregated data collected by national statistical units, ministries, and donor-funded projects severely limits the ability to assess the effectiveness of EAS programs.
- **Evaluate the impact of extension services on reducing gender disparities in agricultural productivity.** The shift from top-down and technology-driven approaches to demand- and market-driven approaches is meant to create more responsive service delivery. This should translate into women farmers being able to shape service delivery to meet their needs. Greater investments need to be made to systematically evaluate the results and to identify the strategies that have been most successful.

Source: (Manfre, Rubin, Allen, Summerfield, Colverson and Akeredolu, 2013)

3.1.5. The role of agricultural extension workers

Along with the evolution of agricultural extension and advisory services, the role and responsibilities of agricultural EAW has changed over time. At the beginning, the role of the extension worker was mainly to develop 'know-how', focusing on the idea of technology transfer; it then shifted to 'do-how' and 'learning by doing' with the rise of participatory methods and the development of FFS model; to 'human -how' emphasizing on the importance of soft skills, giving more weight to social, cultural and gender considerations etc.; to what we know more recently as 'international how' that brings the issue of local and international access to market. This picture will keep changing as the need for extension service will evolve. The role of agricultural EAW today is not "limited to providing information on crop or animal production. It involves education and technical assistance to achieve local food security - production, processing, marketing and distribution of safe and nutritious food for all consumers. It is an educational service 'from farm to fork'" (Suvedi and Kaplowitz, 2016).

Agricultural extension and advisory workers serve as channel to disseminate nutrition messages to rural communities. Fanzo *et al.* (2013) identified four key reasons why agricultural EAS delivery systems should be perceived as a strong tool to use. First, usually extension workers have a well-established structure which often comes along with **reaching many farming communities** in rural and remote areas. They also have a relatively strong and well established relationship with the farming community, which makes it easier to talk about more sensitive issue such as gender and the family nutrition and diet. Most of the time the extension

workers are also members of the community, therefore they have **better knowledge and understanding** of the local social norms, cultures and beliefs. Finally, they are more inclined to demonstrate **empathy** with the rural community, since they are familiar with the challenges and constraints they are facing on a daily basis.

Suvedi and Kaplowitz (2016) identified two categories of necessary skills for extension workers: the **process skills – also called functional competencies or soft skills** and the **technical skills**. The technical skills which vary by field of specialization (agricultural, forestry, livestock, water, etc.), are crucial for disseminating the expertise. Technical skills refer for instance to: identification of crop diseases, testing the soil pH or doing artificial insemination on dairy cattle. On the other hand, process skills are needed for the smooth functioning of the agricultural EAS interventions. Process skills encompass: facilitation skills, conflict resolution skills and the ability to work with multi-stakeholders. Suvedi and Kaplowitz (2016) have also identified four core competencies needed by front-line extension workers, these are: program planning, program implementation, program evaluation, and communication and informational technologies.

Even though agricultural EAW may receive training in nutrition and food security, collaboration with other rural stakeholders is needed. As Callens and Gallagher (2013) pointed, “there is much scope for the collaboration of health workers and community development workers with extension agents in planning and implementing a locally adapted curriculum to cover special topics focusing on issues of nutrition and household food” (Callens and Gallagher, 2003).

3.2. Leveraging nutrition through agricultural EAS

We tend to assume that well conducted agriculture interventions increase food productivity, which leads to increased food availability, which in turn directly improves the nutritional status of the concerned population. Berti, Krusevec and Fitzgerald (2003) consider this assumption to be behind the lack of impact assessments of agricultural interventions on nutritional outcomes (Berti, Krusevec, and Fitzgerald, 2003). In order to influence policy makers and to shape policy recommendations, more impact assessments are needed (Larsen and Lilleør, 2015). This section presents key results of some impact assessments to emphasize on the linkages between well designed and well conducted agricultural interventions and improvement of nutritional outcomes of the participants.

Larsen and Lilleør (2015), carried out a study to assess the impact on early childhood health (measured as height-for-age) of an agricultural intervention targeting smallholder farmers' food security in the lean season by providing them with a basket⁴ of new technology in Northern Tanzania. The agricultural intervention assessed was the Rural Initiatives for Participatory Agricultural Transformation, known as RIPAT. RIPAT is another new extension model which has strong similarities with the Farmer Field Schools. The main differences reside in the fact that RIPAT offers a variety of technology options, combines top-down and bottom-up learning methods, and runs for three years with close follow-up as opposed to the agricultural season

⁴ Elements in the basket of technology options include: new banana cultivation techniques and improved varieties, crop diversification, conservation agriculture techniques, post-harvesting technologies, improved animal husbandry, multipurpose trees, soil and water conservation and saving groups (The Rockwool Foundation Research Unit, 2013).

in FFS. The young children from participating households experienced on average an increase of 0.8 standard deviations in their standardized height-for-age measures and the prevalence rates of stunting dropped by 17.6 percentage points. “The study concluded that agricultural interventions can influence the underlying determinants of undernutrition to such an extent that they translate directly into children coming closer to their full growth potential” (Larsen and Lilleør, 2015).

In 2003, Berti, Krasevec and Fitzgerald (2003) reviewed the nutritional impact of 30 agriculture interventions and analyzed the characteristics of interventions that improved nutritional outcomes (Berti, Krasevec and Fitzgerald, 2003). The agricultural interventions reviewed included: home gardening, livestock, mixed garden and livestock, cash cropping, irrigation, extension service, etc. The review was done based on five types of ‘capital’ (physical, natural, financial, human and social) as defined in the Sustainable Livelihoods Framework, developed by the Sustainable Rural Livelihoods Advisory Committee⁵. The findings of the study highlighted the importance of investing in different types of capital (at least four or five) in agricultural interventions to increase the likelihood to have a positive impact on nutrition. Indeed, of the 19 interventions that had an improvement in nutrition status 14 have invested in four or five types of capital. Among these, it seems that the human capital has a greater correlation with nutritional outcomes, especially when nutrition education and gender issues are considered (Berti, Krasevec and Fitzgerald, 2003).

Berti, Krasevec and Fitzgerald finding regarding the important influence of nutrition education on positive nutrition change in participants’ households is in line with the results found when Kuria (2014) assessed the integration of nutrition in FFS and FFLS in Eastern Africa. The findings revealed that kitchen gardens were used as channels to promote the production of vegetables and fruits. Participants of the FFLS indicated that they received advices to consume what they had produced and were sensitized on the importance of eating different vegetables and fruits and having a good nutrition, especially in the context of HIV/AIDS management. The vegetables produced in the kitchen gardens were used for home consumption, and the surplus was sold to earn income to purchase non-food items. The sampled households that participated in the project were found to be consuming more meals than they did before joining the FFLS project. Participants also said that issues related to health, care and the use of income generated from food surplus sold in the market were addressed during the FFLS.

These results confirm that nutrition education to the vulnerable people may enable them to make informed decisions when it comes to consuming a healthy diet.

3.3. Brief country case studies on the integration of nutrition into national agricultural EAS

A wide variety of different agricultural EAS models have been undertaken at country level. However, accessing information about the implementation of these models and their results is difficult. Available information is geographically unevenly distributed with some regions and

⁵ The Sustainable Livelihoods Framework is a tool developed by the Sustainable Rural Livelihoods Advisory Committee based on the previous work of the Institute of Development Studies. The framework presents the main factors that affect people’s livelihoods and relationship between these. It can be used for planning new development activities or for assessing the contribution of activities on livelihood sustainability (DFID, 1999).

country experiences better documented than others. For instance, Eastern Africa with the cases of Uganda, Kenya and Ethiopia have received a lot of attention compared to Central or Western Africa. Table 4 shows different models of agricultural EAS interventions experienced in some countries as of 2008. Sharing information and country experiences is a determining factor for improving interventions and programmes. Interesting interventions regarding the integration of nutrition into agriculture extension in the Africa region and worldwide have been highlighted among others by Anderson (2007), Davis K. E. (2008) and Fanzo *et al.* (2013).

Table 4 : Extension models and number of agents in selected SSA countries

Country	Current Model(s)
Angola	Rural Development and Extension Programme; FFS
Benin	Participatory management approach; decentralized model; FFS
Burkina Faso	FFS
Cameroon	National Agricultural Extension and Research Program Support Project; FFS
Ethiopia (65 000 ^a)	Model based on SG-2000 approach: Participatory Demonstration and Training Extension System; FFS
Ghana	Unified Extension System (modified T&V); pluralistic with NGOs and private companies part of the national extension system; decentralized; FFS
Kenya	Pluralistic system including public, private, NGOs; FFS; stakeholder approach (NALEP): sector-wide, focal area, demand-driven, group-based approach
Malawi	Pluralistic, demand-driven, decentralized; "one village one product," FFS
Mali	Modified T&V; both private and parastatal services for cotton; FFS; SG-2000
Mozambique (1 068)	Government-led pluralistic extension; FFS
Nigeria (5 252)	FFS; participatory; SG-2000
Rwanda (500)	Participative, pluralistic, specialized, bottom-up approach; FFS
Senegal	FFS; government-led demand-driven and pluralistic system; FFS
United Republic of Tanzania (7 000)	FFS; group-based approach; SG-2000; modified FSRE from Sokoine University of Agriculture's Centre for Sustainable Rural Development; private extension; decentralized Participatory District Extension; pluralism
Uganda	Pluralistic; National Agriculture Advisory Services (NAADS) is demand-driven, client-oriented, and farmer-led; SG-2000; FFS
Zambia	Participatory Extension Approach; FFS

Source: (Davis K. E., 2008)

Even though interventions from Ethiopia, Ghana, Kenya and Uganda are well documented in literature due to the specificity and innovativeness of their extension and advisory services systems, they will be briefly presented in this report to highlight the gap they still need to overcome to mainstream nutrition in their interventions. In most of these countries, except Kenya, nutrition is neither clearly stated in the objectives nor in the outcomes of the interventions.

Ethiopia

Committed to end hunger, the Government of Ethiopia has decided that the agricultural sector would be the spearhead for the fight. In 2008, 16 % of the government budget was dedicated to the sector (Davis *et al.*, 2010) and high rates of economic growth were attributed to the increases in the area under cultivation and in agricultural productivity. To continue the progress, between 2005-2010 the government put in place the Plan for Accelerated and Sustained Development to End Poverty (PASDEP), followed-up by the Five Year Growth and Transformational Plan (FYGTP) from 2010-2015.

A Key component of Ethiopia government's investment in agriculture has been the public agricultural extension system; the government has drastically increased the number of

extension workers (called Development Agents – DA) from 15 000 to more than 60 000 through the PASDEP. Now the DAs receive a three-year diploma through the Agricultural Technical and Vocational Education and Training (ATVET) colleges, compared to a nine-month training they used to have before (Davis *et al.*, 2010). The ATVET is one of the four main components of the extension services in Ethiopia outlined in the PASDEP along with:

- (i) Participatory Demonstration and Training Extension System (PADETES)
- (ii) Farmer Training Center (FTC)
- (iii) Institutional Coordination

The purpose of ATVET is to train DAs to work in FTCs to enhance the knowledge base skills of farmers. ATVET provides a diploma in one of the five following disciplines: animal science, animal health, agricultural cooperatives development, natural resources and plant sciences. All the ATVET colleges provide diploma in animal science, natural resources and plant sciences, and only few offers diploma in animal health and agricultural cooperative development (Davis *et al.*, 2010).

The goal of PADETES is to improve income via increasing productivity, ensuring self-sufficiency in food production, establishing farmers' organizations, increasing export crops, conserving natural resources and increasing women's participation in development.

The FCT were designed as local level focal points for farmers to receive information, training, demonstrations, and advice, and included both classroom and demonstration fields. The FCTs are staffed with DAs (Fanzo *et al.*, 2013).

In Ethiopia, agricultural extension and advisory services is decentralized at *Kebele* level (the lowest administrative) and at *Woreda* level (the district) and is mostly provided by public sector under the mandate of the Ministry of Agriculture and Rural Development (MOARD). According to Fanzo *et al.* (2013), the focus of extension is mainly on production, technology and food security which is justified by the fact that DAs are still being trained only in three disciplines: crops, livestock and natural resource management (Fanzo *et al.*, 2013). There is very little emphasis on nutrition, gender, culture, youth and HIV/AIDS prevalence in the Ethiopian extension service. Besides of having technical skills for limited disciplines, Davis *et al.* (2010) found that the DAs have very little soft-skills, which could be explained by the fact that the ATVET colleges curriculum contains few, if any, courses such as communication skills, social marketing, and community mobilization (Davis *et al.*, 2010).

Most of nutrition activities in rural communities are done by the health extension workers (HEW). In 2003, the government launched the Health Extension Program (HEP). The HEP trained approximately 40 000 health extension workers – all of them were women. These workers are in charge of providing direct care for children and women at the community health posts and identify model families serving as examples of good practices by the community. The female members of these families are referred as health development army (HDA) (Fanzo *et al.*, 2013).

The government of Ethiopia in partnership with various organizations has developed several training materials for the DAs, the HEW, the EAW, the HDAs and the ADAs. Some of the materials are analysed in Section 5.

Ghana

In 2003, Ghana initiated a reform in its agricultural extension and advisory service system based upon the 1997 decentralization policy. (Anderson, 2007). The decentralization process is still on the way and it will take time for the agricultural EAS system to become fully operational. Compared to Ethiopia, Ghana has a much more pluralistic agricultural EAS system.

What makes the Ghanaian agricultural EAS system particular is that it is: (i) focused on production increase, (ii) market-oriented, and (iii) uses an innovative ICTs approach.

The government of Ghana has developed the Medium Term Agriculture sector Investment Plan (METASIP) to implement the Food and Agriculture Sector Development Policy (FASDEP II) for the 2011-2015 period. The FASDEP identifies the following priority areas for the country: small-holder farmer's income, food security and emergency preparedness, inclusion of agricultural sector in international markets, sustainable environment of agricultural practices, science and technology in agriculture and institutional coordination (McNamara, Dale, Keane and Ferguson, 2014). Nutrition is not mentioned as an objective or area of focus in the FASDEP.

At governmental level, the Ministry of Food and Agriculture (MoFA) through the Directorate of Agriculture Extension Service (DAES) is the primary provider of extension service in Ghana. According to McNamara, Dale, Keane and Ferguson (2014), the MoFA has approximately 3,500 agricultural extension workers nationwide. The MoFA promotes a "unified extension" approach which implies that EAWs work as generalists and support agricultural extension and advisory interventions as well as other activities that MoFA implements in their districts regardless of the focus of the activities (McNamara, Dale, Keane and Ferguson, 2014).

As mentioned earlier, Ghana is in the process of decentralizing its agricultural EAS to district level. The District Offices (DO) generally provide technical support on areas such as: monitoring and evaluation, crops, extension, livestock, veterinary services, women in agriculture development and engineering. While the Regional Offices (also called the Regional Agricultural Development Units), provide coordination and support to the district offices on technical and programmatic issues. At regional level, there are also the Research Extension Linkage Committees (RELCs) that discuss quarterly the nature of agricultural issues and the need of research and extension concerns voiced by farmers. (McNamara, Dale, Keane and Ferguson, 2014).

The two other MoFA offices related to extension services are: the Women in Agriculture Development Directorate (WIAD) and the Human Resources Directorate (HRMD). The WIAD works in the area of nutrition, food safety, value addition, gender and livestock. The HRMD offers a two-year diploma in agricultural EAS in agricultural colleges in Ghana. The curriculum of the two-year diploma is analysed in Section 5⁶.

At civil society level, there are many NGOs (national and international) operating in the agriculture extension sphere in Ghana: ACDI/VOCA, ACDEP, ADRA, CARE, CRS, IFDS,

⁶ The programme is currently under revision with the support of the Canadian government to ensure a better integration of agribusiness and value-chain.

Engineers without Borders, Farm Radio International, Technoserve, USAID, World Vision, etc. These NGOs usually focus on market-oriented agricultural EAS.

The private sector offers mainly advice and information on the use of the inputs (seeds, fertilizers, agro-chemicals, etc.) and equipment they provide to the farmers.

At academia level, the University of Ghana (UoG), University of Cape Coast (UCC), University of Development Studies (UDS) and Kwame Nkrumah University of Sciences and Technology (KNUST), all offer a four-year programme in agricultural extension. Some have integrated nutrition in their curriculum to a varying degree. These curricula are also analysed in Section 5.

The HRMD and universities have shown interest in integrating nutrition in their curricula. Except from WIAD, nutrition does not appear as a clear outcome of agricultural extension in Ghana. According to Fanzo *et al.* (2013) and McNamara *et al.* (2014) important EAS challenges remain regarding in-service training materials and equipment, strengthening partnership with universities, and coordination among the actors from various sector.

Kenya

In Kenya, extension workers and home economics officers are distinct and focused on different activities, but both are under the Ministry of Agriculture and Rural Development. Usually, the role of the agricultural extension worker is threefold: 1) to enhance farmer, staff and stakeholder knowledge and skills; 2) to support the establishment of forums and institutions that promote participation of private service providers in the agricultural sector; and 3) to promote and strengthen farmers' institutions. Whereas home economics officers have completed a curriculum consisting of 60% agriculture specific and 40% nutrition specific.

Like in the two other countries, agricultural extension service activities are under the Ministry of Agriculture and Rural Development (MOARD), but the nutrition activities are led by two distinct ministries: The Ministry of Medical Services (MoMS) and the Ministry of Health and Sanitation (MoPHS). The MoMS focuses on curative nutrition problems and the MoPHS deals with preventive nutrition practices. In 2001, the Ministry of Agriculture and Rural Development (MOARD) underwent a reform on the extension service, shifting towards a more demand-driven system with the creation of the National Agricultural Extension Policy (NAEP). The NAEP has adopted a sector-wide approach to provision of agricultural EAS. The policy is designed to enable extension and advisory services to realize their vision to enable "Kenyan agricultural extension clientele to demand and access appropriate quality extension services from the best providers and attain higher productivity, increased incomes and improved standard of living by 2015" (Cuellar, Hedlund, Mbai and Mwangi., 2006). The NAEP includes modern technology, gender, environmental conservation, HIV/AIDS, communicable diseases issues, health and nutrition among the cross-cutting issues to be mainstreamed. Following the NAEP, the government continued to strongly engage in making food security and nutrition a national priority which is illustrated by the numerous national policies integrating nutrition: the Strategy for Revitalizing Agriculture (SRA), the Food and Nutrition Security Policy, the Health Strategic Plan and the National Nutrition Action Plan 2012-2017 (NNAP) (Cuellar, Hedlund, Mbai and Mwangi., 2006) (Fanzo *et al.*, 2013). The NNAP specifically mentions the need to build capacity of extension agents and all front-line workers to incorporate nutritional considerations and messages into their work.

Despite those efforts, an assessment conducted in 2012 revealed that the country was facing a shortage of nutrition personnel, and even the existing staff demonstrated inadequate knowledge of clinical nutrition. As a result, the agriculture sector was required to play a stronger role in mainstreaming food security and nutrition in the interventions. The Ministry of Agriculture has the ability to reach-out a greater number of households and as such could intervene with household nutrition through the home economics officers. The home economics sub-division is also under the MOARD and has two branches: the first one on nutrition and the latest on appropriate technologies. Under the nutrition branch, activities promoting nutrition interventions such as kitchen garden, raising small livestock, preparation and preservation of food, and crops and dietary diversification are conducted. As of today, home economics officers are delivering nutrition education to communities. The public agricultural extension workers to farmers is 1:1 000 which is more encouraging than the ratio of nutritionist to farmers 1:93,000 (Fanzo *et al.*, 2013).

In 2000, the Swedish International Development Agency (SIDA) in partnership with the MOARD started the National Agriculture and Livestock Extension Programme (NALEP) Phase I. The NALEP is based on the NAEP, but with the specificity of mobilizing Common Interest Groups (CIGs) among farmers and encouraging value addition and processing activities. It is in line with overall government policy for the agricultural sector and the national priority of poverty alleviation. The NALEP goal was to promote the socio-economic development of the agricultural sector in its broadest sense (including livestock, forestry and processing activities based on agricultural raw materials). According to a self-conducted impact assessment of the phase 1 of the NALEP, the programme was found to have had a positive impact on the renewed focus on local vegetables by the participants of the programme. “The majority of women interviewed in the assessment seem to have expanded their vegetable production both for subsistence and as a market commodity. Local varieties have been promoted. For example, most women interviewed in Ibeno focal area in Kisii District have initiated vegetable gardens up to ¼ acre planting black knight shed, spider flower and sukuma wiki. The vegetable gardens are particularly important for the poorer households, as the seeds for local vegetable varieties are readily available without any costs” (Cuellar, Hedlund, Mbai and Mwangi., 2006).

Uganda

The agriculture extension model of Uganda followed the same pattern as many other African countries: important efforts was put in place to have an efficient extension service after the independence, but extension became neglected until the mid-eighties with the resurgence of extension with new models like training and visit. At the end of the nineties, Ugandan government developed a Plan for the Modernization of Agriculture (PMA). One important component of the plan was the Uganda’s National Agricultural Advisory Service (NAADS) programme created in 2001. The purpose of the NAADS is to increase the proportion of market oriented production by empowering farmers to demand and control agricultural advisory and information service. The NAADS has the following features:

- (i) Decentralization at sub-county level
- (ii) Outsourcing to private sector or non-governmental organizations (national or international)
- (iii) Farmers’ empowerment: to form interest group at the community level and identifying a farmers’ representative to participate and make decision in farmers’ fora at the sub-county level.

- (iv) Market orientation: to assist farmers accessing national and international markets
- (v) Increasing cost recovery by paying extension fees to reduce the high cost of extension on the government

As shown from this list, the NAADS has not established nutrition as a priority. Fanzo *et al.* (2013) report that a “coordinator affirmed that nutrition was not a priority in the program and that often, food security is perceived to equal good nutritional status among extension workers”. Actually, an evaluation of the NAADS concluded that “NAADS program has helped to strengthen farmers’ capacity to potentially demand and manage the delivery of agricultural advisory services that are likely to meet their local production and market conditions. However, the results were mixed, and it was difficult to determine if participants in the program had increased agricultural productivity that led to improved food and nutrition security outcomes, as compared to non-participants” (Fanzo *et al.*, 2013).

These four country cases illustrate the complexity of agricultural extension services system and the challenges of developing a nutrition-sensitive agricultural EAS system. Kenya seems to have made more progress thanks to a stronger political commitment to mainstream nutrition within agricultural EAS. Ghana has great opportunities to integrate nutrition through the WIAD and the HRMD.

3.4. Challenges and opportunities from the literature

3.4.1. Challenges related to the integration of nutrition into agricultural EAS

The literature reviewed for this study revealed a couple of challenges to the integration of nutrition into agricultural EAS in Africa.

The most cited challenges are related to the **ineffective training** received by agricultural EAW that don’t allow them to effectively conduct nutrition-sensitive agricultural extension and advisory services. The agricultural EAW receive minimal nutrition training that is often theoretical as opposed to more practical production topics. Indeed, Kuria (2014) in her study on nutrition integration into FFS in Eastern Africa found that “the facilitator training included minimal nutrition content apart from production aspects, and lacked information on food utilization, preservation and storage and consumption and preparation” (Kuria, 2014). Therefore, it is often difficult for the agricultural EAW to translate their knowledge into practical interventions that could improve the farmers eating habits and diets.

Many authors confirm the importance of strengthening the nutrition component in agricultural extension and advisory training programmes (Callens and Gallagher, 2003) (Fanzo *et al.*, 2013) (Sigman, Rhoe, Peters, Banda and Malindi, 2014).

Fanzo and al. (2013) highlight another very important challenge that was not often mentioned in literature: the **unclear organizational mandates** of the agricultural EAS. Having an unclear mandate for agricultural EAS makes it challenging to develop a national strategy to mainstream nutrition. Many countries do not have a clear definition of what is expected from agricultural EAWs. As a result, they end up delivering EAS for a wide range of topics, going from strictly agriculture to agribusiness, climate smart agriculture, nutrition-sensitive, gender-sensitive etc.; which lessen the impact that they could have on the communities.

This particular challenge pinpoints the disconnection between the training that agricultural EAWs receive, what they actually do and the country priorities. Government do not often associate agricultural AES in the definition of the national agricultural priorities and needs. As a result, agricultural EAW are not been used to their full potential to contribute reaching the national goals and having a more important impact.

Another challenge that is also related to the unclear mandates is the lack of collaboration and communication between health extension workers and agricultural extension and advisory workers: they are still **working in silos**. Instead of joining forces and collaborating, they tend to be competing over resources, which diminishes the impact on the community. The integration of nutrition into agricultural extension training, may evoke fear among the health extension workers of a reduced demand for their expertise. This illustrates the lack of common understanding over the mandates and a lack of joint planning action (Fanzo *et al.*, 2013).

The fourth commonly cited challenge in the literature is related to the **limited resources**.

- Limited human resources: the very few agricultural extension workers in the field and the uneven distribution in the country make it challenging to reach a greater number of beneficiaries.
- Time and material constraints: with no tools, no diagrams, no nutrition modules or no recipes at the disposal of the agricultural EAWs to share with communities, it is difficult for the extension workers to be easily understood by members of the community that have lower literacy and educational level.
- Transportation and housing limitation: prevent agricultural EAWs to reach rural communities in remote areas.
- Shortage of funds: it is difficult to trace the relationship between extension inputs and their impact at the farm level and beyond since there are many factors that affect the performance of agriculture in complex and contradictory ways. This issue makes financial commitment by public and other investors often problematic (Anderson, 2007) (Sigman, Rhoe, Peters, Banda and Malindi, 2014).

3.4.2. Opportunities related to the integration of nutrition into agricultural EAS

There are various opportunities in linking nutrition with agricultural EAS. Agricultural EAS can serve as a platform where good nutrition and healthy eating habits are promoted from farmers' soil to community plate. The opportunities are divided into institutional and organizational opportunities and operational opportunities.

Institutional and organizational opportunities

For countries that had conducted a **local context assessment** either by: (i) collecting primary data through interviews and focus group with local stakeholders, or (ii) collecting secondary data on nutrition in surveys such as Demographic Health Survey (DHS), UNICEF's Multiple Indicator Cluster Survey (MICS), Standardized Monitoring and Assessment of Relief and Transitions (SMART), the first and major entry-points for mainstreaming nutrition component into agricultural EAS is the result of the assessment. In fact, the assessment identifies the reality of the nutrition situation in the community and it can guide agricultural EAS programmes

on which nutrition-related interventions will be the most effective in reducing malnutrition (Fanzo *et al.*, 2013) (FAO, 2016).

For the local context assessment, it is essential to begin the work together with local stakeholders and to collaborate in conducting the in-depth analysis of the specific biophysical and socio-economic conditions of the community. This is important, because – as Fanzo *et al.* point, “inaccurate information regarding weaknesses on nutrition security could trigger misguided interventions that are not cost-effective” (Fanzo *et al.*, 2013). The local context assessment should include potential food resources, agro-ecology, seasonality of production and income, access to productive resources such as land, market opportunities and infrastructure, gender dynamics and roles, opportunities for collaboration with other sectors or programmes, and local priorities (FAO, 2015). Knowing existing national or regional frameworks and programmes for agricultural development, especially EAS, is also important to ensure alignment of EAS programmes with the broader government goal and create potential for scale-up.

There are other opportunities for countries with a strong **political commitment** to nutrition-sensitive agriculture (like Kenya). In these countries, it is important to capitalize on the multi-sectoral coordination mechanism in place for advocating in favour of nutrition-sensitive agricultural extension and advisory services. (Fanzo *et al.*, 2013). This could also contribute to overcome the challenge related to unclear organizational mandates of extension workers and breaking the silos.

There is also an opportunity for countries that are experiencing decentralization of their agricultural EAS system. When decentralizing, the opportunity could be seized to **re-establish government’s field-level technical assistants’ posts** and increase female staff at area level rather than at extension planning level. This will contribute to address the shortage of field level staff. The same opportunity could be applied for countries moving towards a more pluralistic or driven extension system (Sigman, Rhoe, Peters, Banda and Malindi, 2014).

Some countries, such as Ghana, are currently carrying-out a revision of their agricultural extension and advisory services training programme (it could be at governmental level or at university level). In that situation, the opportunity could be taken to **improve the training of agricultural EAWs**. Nutrition could be promoted as a topic in post-secondary or vocational schools where agricultural EAWs are trained. Reviewing educational institutions curricula with the aim of further integrating nutrition content for pre-service extension service could be a first step. Besides, government agricultural extension workers and those from health and those working in community development could also receive more adapted training (Sigman, Rhoe, Peters, Banda and Malindi, 2014). This will help nutrition being recognized and accepted as a discipline (Fanzo *et al.*, 2013).

Finally, the **expansion of the use of ICT** could be one of the most promising opportunities for positively impacting the agricultural EAS in a cost effective and efficient manner. With a technology based approach fewer extension workers in the field could have a greater impact as there is less need to travel in remote areas (Fanzo *et al.*, 2013).

Programmatic opportunities

According to studies carried out by Berti, Krusevec and Fitzgerald (2003) and Kuria (2014) **nutrition education and gender interventions** are strong entry-points to ensure positive nutritional outcomes of agriculture interventions (Berti, Krusevec and Fitzgerald, 2003) (Kuriah, 2014). Indeed, historically, the topic of nutrition was equated with food preparation, which falls to the female in many cultures. (Sigman, Rhoe, Peters, Banda and Malindi, 2014).

In a more agricultural perspective, and if agricultural EAWs had received proper nutrition education trainings, they could become key players in promoting the production of greater **crop diversity** and locally available **nutrient-dense crops**, and the method of **mix farming systems**. Recent studies from Africa find positive associations between crop diversity and dietary diversity (Dillon, McGee and Oseni, 2015), with Kumar *et al.* (2015) finding that greater crop diversity is associated with lower rates of stunting, but only among children aged 24-59 months (Kumar, Harris and Rawat, 2015). Still, production diversity at the household level is strongly associated with maternal and child dietary diversity, as well as improving child weight-for-height z-scores.

Bio-fortification also serves as an accessible entry-point in improving diets through EAS. Recent trials confirm that bio-fortified food crops appear to have a positive impact on nutritional and functional health outcomes (Moura *et al.*, 2014). The CGIAR's HarvestPlus programme works on increasing the availability of iron, zinc, and vitamin A in staple crops (Fanzo *et al.*, 2013).

Connecting researchers with agricultural extension workers and smallholder farmers is a great opportunity to mainstream nutrition into agricultural EAS. Researchers could be encouraged to work simultaneously on technologies aimed at improving crops production as well as technologies aimed at reducing malnutrition, they could go beyond bio-fortification and the use of mobile phone (Fanzo *et al.*, 2013).

Farmers Field Schools model (including PFS, JFFLS) provide also an easy entry-points and platform for the integration of nutrition into EAS. The model with its experiential and practical learning nature provides opportunities to learn about nutrition in a practical manner, thus enhancing effectiveness of nutrition training. The participatory nature of the FFS approach also has the potential to increase the long-term impact of projects (Kuriah, 2014).

4. KEY FINDINGS ON DIFFERENT MODELS OF EXISTING EXPERIENCES OF INTEGRATING NUTRITION INTO AGRICULTURAL EAS AT COUNTRY LEVEL

In order to bring a new contribution to the global discussion on mainstreaming nutrition into agricultural extension and advisory services, the country experiences of Burkina Faso, Senegal and Sierra Leone are presented. These three case-studies highlight how nutrition can be integrated in different agricultural EAS models. In Burkina Faso nutrition education was incorporated into a pre-service training, in Senegal it was incorporated in a FFS, and in Sierra Leone agricultural EAWs are trained with the new manual developed based on the food-based dietary guidelines (FBDGs).

4.1. Nutrition education in the curriculum of agriculture training institutions: The case of the integration of the ENAF course at the Polytechnic University of Bobo Dioulasso/Institute of Rural Development (IRD/PUB), Burkina Faso

Context and justifications

During the past decade, Burkina Faso's economy has grown considerably, with an annual average growth rate of over six percent between 2000 and 2012 (FAO, 2014b). However, despite a decade of sustained growth, poverty persists, particularly in rural areas. GDP per-capita remains one of the lowest in the world. According to the United Nations Development Program (UNDP) 2014, the Human Development Index of Burkina Faso is ranked 181 out of 187 countries, and over 44 percent of the population lives below the poverty line (USAID, 2015). The economy is highly vulnerable to external shocks, both climatic and economic. The country also suffers from the negative effects of a population growth rate averaging 3 percent, which is among the highest in the world (FAO, 2014b). Furthermore, the 2012 coup d'état in neighboring Mali and rebel uprising in the north displaced hundreds of thousands of Malians. An estimated 32,082 refugees remain in Burkina Faso, placing additional strain on the food security of host communities (USAID, 2015).

In Burkina Faso, the rates of food insecurity and malnutrition are chronically high. Food insecurity affects 50 percent of households (USAID, 2015). The number of people undernourished rose from 3.8 million in 2008-10 to 4.4 million in 2011-13, corresponding to nearly a quarter of the total population (FAO, 2014b). The global acute malnutrition among children under five is above 8 percent and stunting among children under five is nearly 30 percent (USAID, 2015).

The economy heavily depends on agriculture, forestry and livestock farming, as well as the exploitation of mineral resources. Agriculture contributed to about 30 percent of the GDP in 2012, employing over 90 percent of the workforce (FAO, 2014b). The sector is dominated by small-scale farms of less than 5 hectares and its main products are sorghum, millet and maize (the most produced in terms of volume), and cotton (the most important in terms of value). Traditional cereals, such as sorghum and millet, dominate food consumption and expenditure of rural households, while urban households prefer rice and maize (FAO, 2014b).

Although access and availability of nutritious food are key, they are not sufficient to ensure that people are well nourished. It is essential that people understand what constitutes a healthy

diet, what nutrition-related problems affect their communities and how to address these through food-based approaches. They should also have the right attitudes towards nutrition, diets and foods to be able to perform optimal dietary or feeding practices that ensure their nutritional well-being and that of their families. For this to happen, nutrition education for behavior change is essential.

In 2010-2011, FAO has conducted in 2010–2011 a need assessment of training in nutrition education in professional and academic context. The assessment carried-out in seven Anglophone African countries (Botswana, Egypt, Ethiopia, Ghana, Malawi, Nigeria and the United Republic of Tanzania) and other studies has confirmed that there are significant gaps regarding the training in nutrition education in both professional and academic contexts. These gaps could seriously undermine the effectiveness of interventions in food security and nutrition to improve the habits and dietary intake of the population. The same assessment was conducted in 2014 in Benin, Burkina Faso, Burundi, Cameroun and the Niger to confirm these findings in Francophone Africa. It is in this regard that FAO in collaboration with African universities developed the ENACT course for professional training in nutrition education to contribute to the reduction of food insecurity and malnutrition through behavior change Africa.

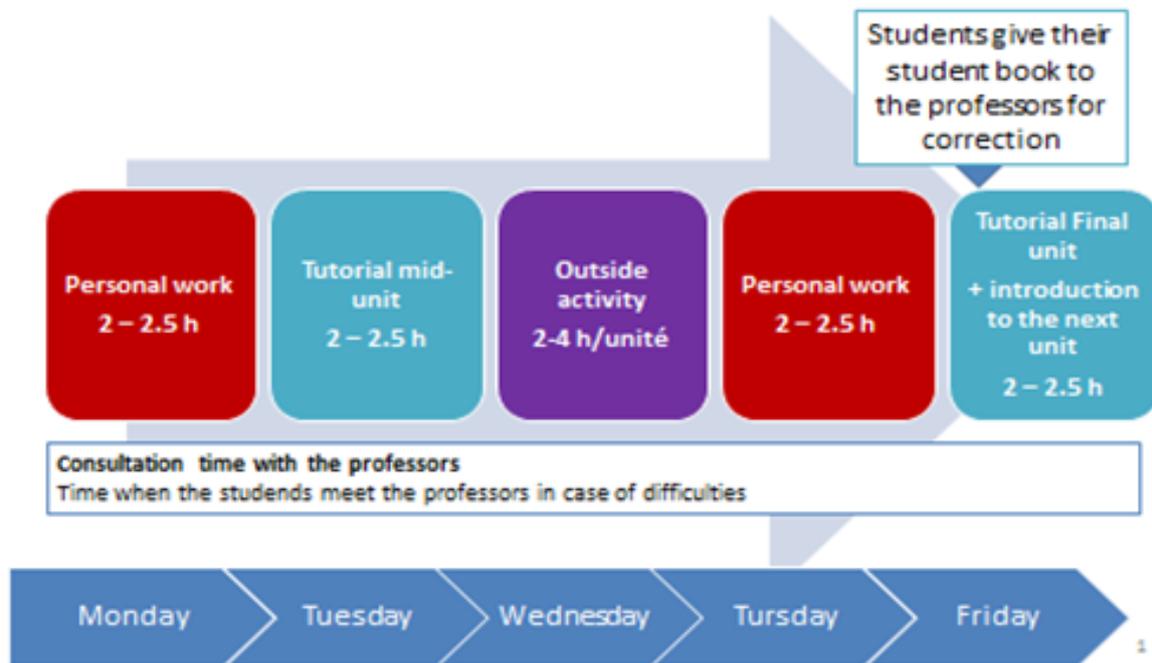
The case study is composed of the key steps followed during the implementation of the ENAF project. The first section allows an understanding of the ENACT/ENAF course, followed by a section on the selection process of the universities for the piloting, then the different meetings (briefing of the tutors, pre-piloting) in view of the preparation of the piloting are presented. Finally, the post piloting workshop is explained with the next steps and the lessons learnt from this experience.

What is the ENACT/ENAF course?

With the support of the German Ministry of Food and Agriculture (BMEL), FAO started the ENACT Project “Education for Effective Nutrition in Action” in January 2012 with the objective to develop and pilot a professional training course in nutrition education at undergraduate level (called ENACT course) and develop other materials in order to strengthen local capacity in planning, implementing and evaluating nutrition education.

The particularity of the ENACT course is that it is an 11-week course that covers the basic principles and practice of nutrition education, including planning, designing and implementing a small nutrition education intervention. Taking the ENACT course is different from taking any other university course: there are no lectures, no textbooks, no essays, no lecture notes. It is rather a new learning approach, involving a mix of personal/independent work/activities and highly interactive tutorial meetings (where students make presentations, role plays, discuss, argue, etc.) in presence of a tutor who facilitates the discussions and activities, emphasizing on the local context and real-life practice. The course also includes “outside activities” and a mini-project in nutrition education. The course was initially developed for nutrition students with a strong notion of nutrition.

Figure 5 : Example of a chronological unit sequence



The ENAF project is the expansion of ENACT to Francophone Africa. It started on the 1st of January 2014 and aims at piloting the translated ENACT course in Francophone African institutions and adapting it to the local context so as to integrate it in the regular university curricula. However, instead of focusing on nutrition students, the ENAF course was piloted with students having a nutrition background as well as an agriculture background (but with basic notions of nutrition)⁷.

Selection process of universities for the piloting

A call for application with specific criteria assessing the universities' capacity to offer this course was launched. The application of each university was assessed against the following criteria:

- (i) Information on the curriculum (i.e. inclusion of courses or not of nutrition and/or nutrition education in the curriculum,)
- (ii) Job prospects after graduation (i.e. experience with communities and opportunity to conduct nutrition education activities)
- (iii) Relevant experience of the organization, motivation and perceptions on nutrition education (i.e. experience/role in nutrition education, motivation to pilot the nutrition education course and perceptions of nutrition education)
- (iv) Tutors' profile (i.e. competence or experience in teaching nutrition and/or nutrition education)
- (v) Students' profile, recruitment and support (i.e. students' previous nutrition knowledge and computer literacy, as well as means of recruitment, motivation and support)

⁷ It was required that the students had followed a basic nutrition class

- (vi) Resources (i.e. available resources (equipment and classroom) and additional needs, as well as IT and Internet access to tutors and students)
- (vii) Timeline (i.e. characteristics of the proposed timeline (feasible, realistic, enough time given between tutorials, enough time given for self-study) and availability of the tutors outside class time)
- (viii) Sustainability of the ENAF course within the piloting institution (i.e. plan of integration of the ENAF course into the Organization's curriculum and provision of a certification)
- (ix) Global quality of the application
- (x) Geographical and sectorial distribution

Then, the shortlisted universities went through a telephone interview and the final decision was made regarding the universities that would pilot the ENAF course:

- (i) University of Abomey-Calavi, Benin;
- (ii) University of Ouagadougou, Burkina Faso;
- (iii) University of Ngozi, Burundi;
- (iv) University of Dschang, Cameroon;
- (v) CRESA (Centre Régional d'Enseignement Spécialisé en Agriculture), Faculté d'Agronomie, University Abdou Moumouni, Niger.

Briefing meeting with the tutors from the selected universities

A briefing meeting was organized in February 2015 with the two tutors selected to pilot the course in each country. The specific objectives of the meeting was to: (i) ensure a common understanding of nutrition education and the notions related to it; (ii) introduce the ENAF project and the approach used through the revision of the ENACT project feedbacks; (iii) ensure a common understanding of the methodology to use to carry out the study on the nutrition education situation as well as the training in nutrition at country level and finally (iv) ensure a common understanding of administrative aspects of the agreement between the universities and FAO.

Pre-piloting workshop

Following on the meeting, each university carried-out the study on the situation of nutrition education and the training in nutrition education available in their respective country. The results of the studies were presented during the pre-piloting workshop that took place in June 2015 in Ouagadougou, Burkina Faso with the participation of the five selected partner universities⁸. The objective of the pre-piloting meeting was threefold: (i) familiarize the tutors with the objectives, approach, structure, content and pedagogical tools of the ENAF course to pilot the course in an efficient manner; (ii) train the tutors on how to conduct tutorials with the students; and finally, (iii) familiarize tutors with evaluation documents they have to use during the piloting to collect feedback for the course adaptation.

The Institute of Rural Development of the Polytechnic University of Bobo Dioulasso (IRD-PUB) was invited as a guest on the first day of the workshop and demonstrated a strong interest in

⁸ The University of Ouagadougou in Burkina Faso was selected to pilot the class but for administrative reason had to stop the piloting.

participating to the piloting of the course. As a result, it was agreed that the IRD submitted an application to pilot the course. Their application was reviewed and an agreement was given for them to be the sixth university to pilot ENAF.

With IRD jumping on the bandwagon another pre-piloting workshop with the two tutors had to be done since IRD only took place at the first day of the general pre-piloting workshop with all other partners. This special pre-piloting with the two tutors from IRD took place in Ouagadougou and had the exact same objective than the general one.

The piloting

Recruitment of students for participating in the ENAF course

Once the two IRD tutors familiarized with the ENAF course and materials, the first step consisted in recruiting the students who would take part in the project. To be effective the course suggested between 20-25 students. Because IRD have the particularity of having five specializations in the institute (Agronomy, Sociology and Rural economy, Water and Forestry, Livestock and Agricultural extension) it would have been interesting to have all of them represented in the project. A selection exam was given to students and the five best scores of each specialization were selected (Table 5).

Table 5 : Students participating to the ENAF project according to their specialization

Specialization	Number of students
Agronomy	7
Agricultural Extension	5
Sociology and Rural Development	5
Livestock	5
Water and Forestry	3 ⁹
TOTAL	25¹⁰

Among the 25 selected students, five are women.

Introductory unit: Unit 0 – Nutrition Definitions and Concepts

The students from IRD didn't attend nutrition courses in their schooling. In order to make the ENAF course more intelligible, it was decided to had an additional unit, named Unit – 0: Nutrition Definitions and Concepts, to the course with two tutorials: one on basic nutrition knowledge and the other on nutrition-sensitive agriculture. The unit 0 was developed based on the nutrition courses available on FAO E-Learning center.¹¹ Furthermore, the students were required to read two publications: “The Family Nutrition Guide¹²” and “Agreeing on Causes of Malnutrition for Joint Actions¹³” before the Unit 0 started.

⁹ The Department of water and forestry had fewer students participating because less students showed interest in participating in the piloting of the course. It was compensated by the recruitment of the following best scores which happened to be in the department of Agronomy.

¹⁰ A student had to abandon the course for personal reason. The total number of students passing the ENAF course was 24.

¹¹ Available at: <http://www.fao.org/elearning/#/elc/en/courses/NUTR>

¹² Available at: <http://www.fao.org/docrep/007/y5740e/y5740e00.HTM>

¹³ Available at: <http://www.fao.org/3/a-i3516e.pdf>

Running of the units

The piloting started on December 2015 with Unit 0 and ended in April 2016 with the final exam of the course. The mid-term exam took place on February 2016. According to the ENAF course methodology, it was expected that the tutors offer one unit per week from unit 1 to unit 10 (about 10 weeks), but a break of one week was taken at unit 6 to help the students getting ready for the second phase of the course (mini-project). For the unit 6-9, the mini project, the students were divided into three groups each with a specific topic, but all targeting exclusively women associations. The topics were the following:

- (i) Promoting the consumption of iron rich food (and more generally micronutrient rich food) among women affected by HIV from the REVSplus association¹⁴
- (ii) Promoting the consumption of iron rich food (only) among the Groupement Yelen association (A production of shea butter association)
- (iii) Promoting consumption of Vitamin A rich foods among women of the Association la Paix

Each group conducted interviews, focus group, observations and interventions with their associations.

Results and feedbacks from the students and tutors

For each unit students and tutors provided feedbacks for modifications and adaptations of the course to their local context. The main remarks received were regarding:

- The length of the course

The course was considered heavy, long and difficult to follow with other course simultaneously. But when it was asked which unit or which activities to remove, the students and tutors affirmed that all units and activities were relevant. They even recommended that the unit 5A which is supposed to be optional become mandatory.

The tutorials that were supposed to last two hours and half lasted at least three hours and half or 4 hours. Therefore, both the students and tutors found that the workload of the course was important.

- The number of activities

The number of activities were considered too many by the students and only few students were able to do all the required activities before the tutorials. This had a consequence on the interaction among students and between tutors and students during tutorials. Only few students were actively participating

- Translation and pagination

As the course materials were translated from English to French, there were translation mistakes and some video links, activities and additional resources were still in English. At several places the pagination was incorrect, therefore the students couldn't easily find the topics.

¹⁴ The students weren't aware of their HIV status

- The level of difficulty

On average, the students found that the level of difficulty of the course was medium. Even though they didn't have a strong background in nutrition they were still able to follow the course.

- Adaptation need for francophone Africa

Most of the case studies in the course are not adapted to francophone Africa.

- Adaptation for agricultural students

The students felt the need of having a more comprehensive course on basic nutrition knowledge such as: human nutrition, food security, nutritional diseases, malnutrition, nutrition surveys, food safety and project cycle, etc.

- Emphasize more on the theory

The ENAF course has a strong practical component. In the context of the educational reform towards the adoption of the LMD structure¹⁵, more weight should be given to the theory in order to have a better balance.

Main challenges during the outside activities and the mini-project:

- Language barriers since not all of the students speak French
- Women availability
- Financial resources (snacks, phone calls, etc.)
- Remote sites

Main recommendations for a better implementation of the ENAF project

- Revise the number of the activities and length of the course
- Revise the translation of the documents (from English to French)
- Dedicate a full tutorial on the preparation of the mini project

Students and tutors complained about the lack of time to prepare the mini project. Tutors suggest to have a tutorial meeting prior unit 6 where they could go through each student group interview guides.

- Insist on animation techniques
- Plan a budget for outside activities and mini project.

Participants need an incentive to encourage them to come to the meeting (e.g. prepare snacks to share)

Post-piloting workshop

Right after piloting the course, a post-piloting workshop was organized in May 2016, with tutors from the five universities to present and discuss the results and feedbacks of the piloting and agree on the recommendations and suggestions to adapt the course material. During the workshop, universities also discussed the different modalities of integration of the course in their programme.

In June 2016, IRD organized a capitalization workshop with key stakeholders from Bobo Dioulasso to share results of the piloted course. The main recommendations from the

¹⁵ The LMD is a new educational structure that consists of a study framework based on 3 cycles of qualification leading to a Bachelor's degree (Licence in France and African francophone countries), a Master's degree and a Doctoral degree.

workshop were: (i) to put in place a pedagogical committee to think about the integration of the course into the curricula of Polytechnic University of Bobo-Dioulasso (not only IRD) as soon as possible; (ii) train two other tutors in each schools of the PUB, and also of other agricultural schools of Burkina Faso, on the ENAF course (approximately 6-10 tutors in total).

Next steps

Advocacy in favor of nutrition education

In September 2016, the IRD will organize a two-day advocacy workshop in favor of nutrition education and training in nutrition education in Burkina Faso. The workshop will bring together more than 20 decision makers from agriculture, health, education academia, and development partners among others. The main objective of the national advocacy workshop will be to clarify the nature and the need for nutrition education, and to advocate for better integration of nutrition education and training in nutrition education at national level.

Training of trainers

Organize a four-day training of trainers, to ensure that more tutors are trained to offer the ENAF course.

Put in place a pedagogical committee

IRD will have to put in place a national pedagogical committee to think about the more sustainable way to integrate ENAF course in the curricula of agricultural schools in Burkina Faso taking into account the new LMD system. Indeed, the heavy workload of ENAF course that require approximately 100 hours of work (personal work, tutorial and outside activities) for the modules is more than what the LMD accept in term of credit. Therefore, it is important that experts gather and discuss more practically the integration strategy.

Disseminate the results of the piloting

Disseminate the results of the ENAF course is essential to encourage other agricultural schools to integrate nutrition course into their curricula.

Lessons learnt

- Nutrition education for behaviour change is needed to promote healthy diets but it is almost inexistent in many nutrition and agriculture training programmes/curricula.
- This experience shows that training in nutrition education can be integrated in university programs teaching agriculture, making agriculture's impact on nutrition greater.
- Sharing and promoting this experience, advocating for better policies for nutrition education and nutrition education training and training of university tutors as ways to promote the integration of nutrition education into agriculture curricula.

Conclusion

According to the feedback received from the students and tutors the piloting of the ENAF course was a success. 95% of the students affirmed to be able to help the population adopt a better eating habits. Some modifications are yet to be done for the course to be adapted to the

local context. The ENAF online course is being piloted with Senghor University in Egypt. The final version of the ENAF course should be available by end 2016. IRD wasn't the first agricultural school to pilot nutrition integration into its curriculum, the Matourkou Agricultural Training Center (CAP/Matourkou) with support of UNICEF experienced in 2015 the integration of nutrition modules into its curriculum (Sodjinou, Thiamobiga, Tapsoba, Cisse, Bosu *et al.*, 2016). There is a great opportunity for working in synergy and joining forces together with CAP/Matourkou and UNICEF to build on the experience of mainstreaming nutrition into these two agricultural schools.

4.2. Nutrition integration into Integrated Pest Management Farmer Field School: The model of Senegal

Context and justifications:

The levels of poverty, food insecurity and malnutrition are alarming in Senegal. Poverty rates have barely declined from 48.3 percent in 2005 to 46.7 % in 2011, and the poverty gap between rural areas (57.1%) and urban Dakar (26.1%) has widened (USAID, 2014). Senegal economic growth is lower than the average in other country in sub-Saharan Africa, 3.3% compared to the regional rate of 6%, which could be attributed to droughts, flooding, continued energy shortages, and substantial contraction in agricultural production as well as a weak investment climate, and declining competitiveness (USAID, 2014) (WFP, 2016).

Food insecurity and malnutrition, in all its forms, remain critical challenges. According to a recent WFP vulnerability analysis and mapping (VAM) study, 46% of households in Senegal are vulnerable to food insecurity, with 20% considered as highly vulnerable (WFP, 2016). Regional disparities exist and are accentuated in rural areas.

Senegal, like most African countries, is confronted to the dual burden of malnutrition (IFPRI, 2014). Undernutrition persists as an underlying factor in Senegal's high under five mortality rate, with 31% of all child deaths attributed to undernutrition. Acute malnutrition and stunting is affecting respectively 9% and 16.5% of children between 6-59 months (SMART, 2015) partly due to poor dietary habits, poor sanitation, and low levels of literacy and nutritional awareness among women. Some studies have shown that in rural areas, early introduction of nutritionally poor complementary foods, in detriment of breastfeeding, increases the development of stunting in children under 2 years (Idohou-Dossou *et al.*, 2003) (Cisse, 2004) (Agne-Djigo, Kwadjode, Idohou-Dossou, Diouf, Guiro and Wade, 2013) (Thurnham, 2013). Stunting is twice as high in rural than in urban areas. Senegal also suffers from "hidden hunger"; micronutrient deficiencies are alarmingly high, as 71% of children under five, 54% of women of reproductive age, and 61% of pregnant women are anemic. Along with undernutrition, overweight and obesity are on the rise in the country. Around 10% of children in schooling age and over 30% of adults are overweight/obese (Faye, Diop, Gati *et al.*, 2011) (Diongue, 2014) (IFPRI, 2014).

Agriculture employs 68% of the labor force but accounts for only 14% of the national GDP. Senegal has great potential to increase its agriculture-led economic growth, which will be key to alleviating poverty and fighting food insecurity. The Niayes zone in Thiès region, is a particularly promising area. Horticulture occupies a very important place there, and is one of the main sources of income. The Niayes zone provide vegetables to the surrounding communities. Indeed, 80% of horticultural production in the country comes from this area (FAO, 2007b). Because of those reasons, it was not surprising to establish FFS in that area.

FFS were implemented in Senegal since 2001. The topics covered by the FFS varied throughout time from integrated pest management to quality management, marketing and gender issues. As of today, most of the FFS in Senegal deal with IPM. A nutrition knowledge survey conducted in August 2015 by FAO showed that among the farmers taking part in those FFS in the Niayes area (Thiès region, Senegal) more than 90% don't have the basic nutrition knowledge and don't know the adequate food combination to have a healthy diet.

In order to fill this gap, in 2015 FAO has initiated a technical cooperation project “Promoting healthy and sustainable agriculture in four large agro-ecological zones of Senegal: Niayes, Vallée du Fleuve Sénégal, Zone Cotonnière and Bassin Arachidier” (TCP/SEN/3502), to pilot the integration of nutrition topics into agriculture.

This case study will: 1) highlight how nutrition was integrated into the integrated pest management (IPM) FFS in the Niayes zone; 2) present the results of the study that was carried-out (before and after the intervention) to assess the nutrition knowledge and the complementary feeding practices of farmers who participated in the FFS, and 3) pinpoint the lessons learnt from this experience.

Nutrition integration into FFS: The Kayar and Djender experience

Interestingly, the pilot project initiated by FAO to strengthen farmers’ capacity to adopt healthy diets and lifestyle, strongly benefited from the FFS system already in place in the country, but suffered from it as well. In fact, FFS in Senegal, like many other countries in sub-Saharan Africa, used to focus primarily on crop production. As a result, the country has no clear and defined strategy for the integration of nutrition into FFS and into agriculture extension service in general. There is neither nutrition curriculum for FFS at the governmental level nor at the educational institutions level. Which explains that master-trainers and facilitators have only limited knowledge on nutrition and nutrition education. Lastly, there is no monitoring and evaluation system with nutrition indicators available for FFS in the country or Africa region. Taking into consideration all these elements, one of the first activity conducted by the FAO office in Senegal was to work on the elaboration of a nutrition guide for agriculture extension workers. The preparation of the guide was realized by a multidisciplinary team of (20) experts from (5) different sectors (Nutrition, agriculture, food technology, rural development, farmer organization). The pilot project was the opportunity to test the guide in order to make changes to best fit the farmers and facilitators needs. 20 facilitators, in collaboration with the master-trainers, were trained for five days on the utilization of the nutrition modules, the facilitation sheets and on the animation methods of the final draft of the guide. The guide is analyzed in Section 5 of the report.

Ten villages from Djender and Kayar communities in the Thiès region were selected for the piloting according to the availability of fields and facilitators: Mbawane, Thieudème, Mbidium, Keur Abdou Ndoye, Keur Matar Gueye, Beer, Mbissao, Santhiou Mame Gor, Djender and Gollam. The piloting took place from August to December 2015 with the collaboration of the Fédération des Agropasteurs de Djender (FAPD)¹⁶.

Each FFS agreed upon the day of the week the sessions will be held. The frequency varied from one FFS to another, but it was suggested to have one FFS session every week. The nutrition session was given in alternation with the IPM session. In other words, one week was dedicated to IPM session and the following to nutrition session. In total, 123 sessions on nutrition were held in the 10 FFS, ranging from nine sessions in Mbawane, Keur Abdou Ndoye and Santhiou Mame Gor to 18 in Thieudeme. This fluctuation was mainly attributed to social, cultural and religious events taking place in the villages, such as: Magal, Maouloud, Tabaski, wedding, baptism, funerals, etc. On average, 154 farmers participated in the FFS; among them,

¹⁶ FAPD is a farmer organization engaged in promoting agroecology in the Niayes area (Thiès, Senegal).

55% were women. The number of FFS's participants also varied from one village to another (from a minimum of six to a maximum of 22) (see Table 6), but the number of participants attending a FFS in a village stayed stable throughout the duration of the project.

Table 6 : Number of sessions and participants by FFS

FFS	Number of sessions	Number of participants
Keur Matar	13	17
Mbissao	12	22
Diender	10	6
Gollam	16	17
Mbawane	9	16
Keur Abdou Ndoye	9	14
Mbidium	12	12
SMG	9	22
Thieudème	18	16
Beer	15	13
Total (effectif)	123	154

Because the guide was not finalized, only eight themes taken were suggested to be covered during the piloting, namely: nutrition: definitions and concepts, food groups, healthy and balanced diet, infant and young child feeding, pregnant and lactating women diet, causes of malnutrition, prevention of micronutrient deficiency and hygiene. It was expected that some themes would have been covered in several sessions or repeated several times due to the piloting timeframe. It appears that the "food groups" and "nutrition: definitions and concepts" were discussed on average three times in the same FFS.

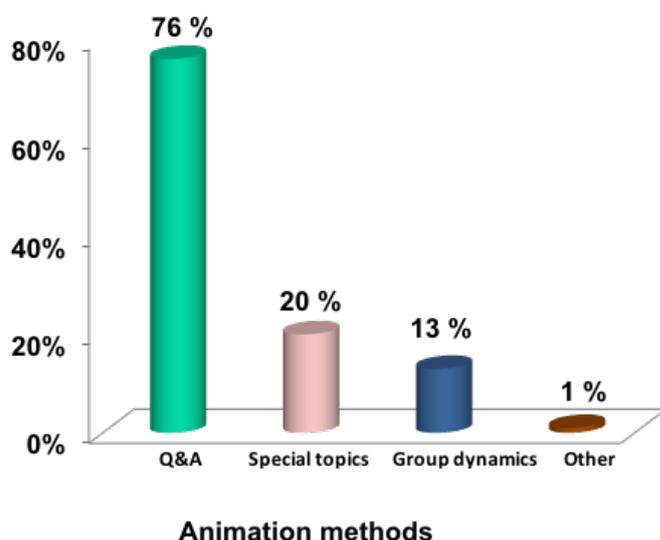
Table 7 : Frequency of the themes discussed

Themes	Frequency (%)
Nutrition: definitions and concepts	30 (24 %)
Food groups	31 (25 %)
Healthy and balanced diet	15 (12 %)
Infant and young child feeding	15 (12 %)
Pregnant and lactating women diet	12 (9 %)
Causes of malnutrition	3
Micronutrient deficiency prevention	4
Hygiene	3

Regarding the animation methods, the facilitators were trained to different types of animation, such as: "questions and answers", "special topics", "group dynamics" or "other". "Questions and answers" consisted of questions asked mainly by participants to the facilitator who gives the answer. "Special topic" is a method where all participants agreed to discuss a special topic during a particular session. "Group dynamics" involve activities such as, role play, song, story

without ending, etc. Finally, the “other” category could include having a guest speaker during the session (e.g. health worker, den mother, private sector). Figure 7 summarizes the animation methods used during the piloting in the 10 FFS.

Figure 6 : Animation methods used during the piloting



Results of the rapid assessment

To assess the outcomes of the pilot experience, two surveys were conducted in the FFS; one before the piloting as a baseline study and one after the piloting.

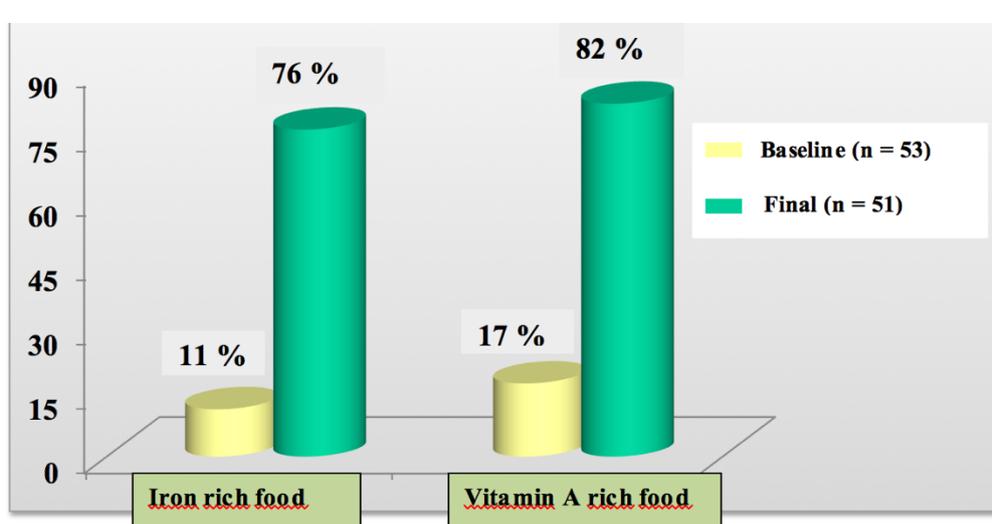
The general objective of the studies was to assess the improvement of nutrition knowledge and complementary feeding practices of famers who participated in the FFS on nutrition. The specific objectives were the following: 1) assess the nutrition knowledge of farmers who participated in the FFS on nutrition; and 2) assess the improvement of complementary feeding practices of children between 6 – 23 months. The assessment followed the knowledge, attitude and practices methodology¹⁷. For the first specific objective data were collected on: basic notions on food and nutrients, healthy and balanced diet, pregnant and lactating women diet and also infant and young child feeding practices. The second specific objective was assessed with the dietary diversity score, meal frequency and 24h dietary recall. 53 farmers were interviewed during the baseline in July 2015 and 51 were interviewed at the end of the piloting in January 2016 (49 were defined as the optimal sample size).

Regarding the nutrition knowledge of farmers, the study revealed significant improvement between the baseline study and the final study. After five months of FFS, 69% of the farmers knew what a nutrient is, and 30% were able to cite at least one type of nutrient. 21% knew what a food group is and 60% could give a correct definition of a healthy diet versus only 2% during the baseline. The most remarkable results were related to the iron and vitamin-A rich foods. 76% of the farmers were able to identify red meat, heart, lung, dry fish, niebe, chicken

¹⁷ The methodology is available at: <http://www.fao.org/docrep/019/i3545e/i3545e00.htm>

etc. as iron-rich food and carrot, mango, papaya, orange sweet fleshed potatoes, palm oil as vitamin-A rich food (see figure 8 below).

Figure 7 : Proportion of farmers who have cited at least one source of iron and vitamin A rich food



The improvement of the knowledge on pregnant and lactating women diet were also conclusive. In fact, 96% of the farmers were able to identify at least three good practices that pregnant and lactating women should adopt compared to only 15% at the beginning. The most cited good practices were: eat more often than usual, eat fruits and vegetables, eat protein and iron rich foods, sleep under a mosquito net and do the prenatal consultation. It was noticed that farmers already knew a lot about infant and young child feeding practices. This could be attributed to the work that some organizations are doing in rural communities. For instance, 72% of the farmers already knew that breastmilk is the first food to give to the newborn; however, improvement was still appreciated (94% at the end of the piloting). Improvement in IYCF were mostly related to recommended breastfeeding duration and the age of complementary food introduction. Eventually, the farmers improved their knowledge regarding malnutrition. 92% can now identify clinical signs of malnutrition.

The results of the second specific objectives highlighted the improvement in the dietary diversity (94% of the children have a dietary diversity score above or equal to four) and the meal frequency of the children (see Figure 9 and Table 6 below).

Figure 8 : Children dietary diversity score

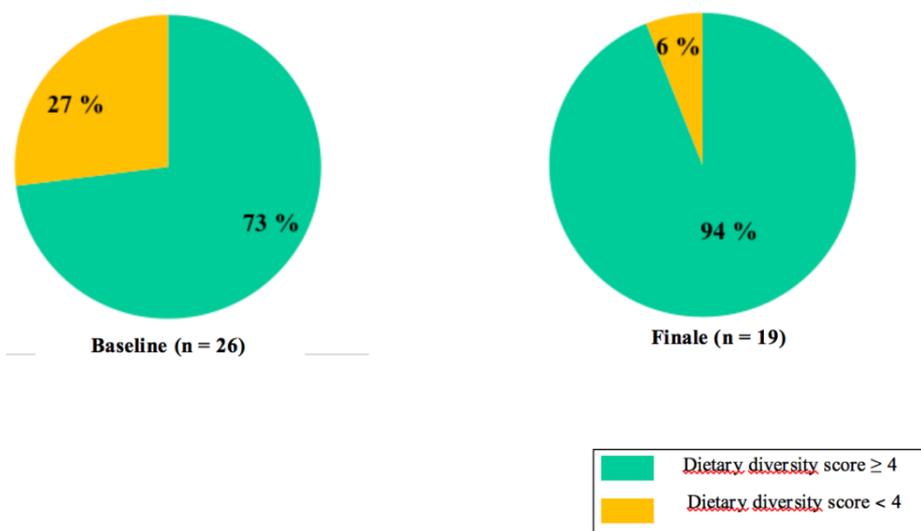
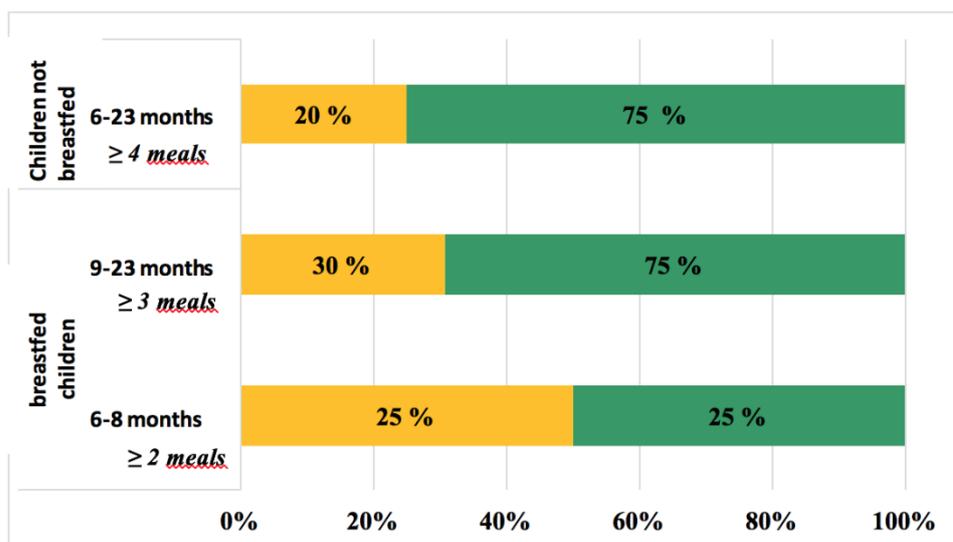


Figure 9 : Children meals minimum frequency



The piloting was concluded in February 2016 by a meeting held with key partners (FAPD, community leaders, trainers of facilitators, facilitators, producers, FAO) to share the results, achievements, lessons learnt and challenges of the piloting, and also to collect feedback and recommendation. This meeting was a key step in the finalization of the Nutrition Guide based on partner's experiences.

Lessons learnt

The lessons learnt from the Bayakh and Djender experiences are the following:

- There is a strong interest of farmers to participate in the FFS on nutrition;
- Organize the FFS outside the rainy season, to have optimal participation of the farmers;
- During the facilitators' training on nutrition emphasize more on animation methods;
- Develop information, education and communication materials to support the facilitators in making the session more interactive and participatory and also to give a visual support to farmers;
- With an adequate training and a good preparation prior to the session, facilitators had a good knowledge of the themes covered by the pilot project;
- Diversify the production methods in some FFS (multi-layer cropping)
- Include community radios, and organize village assembly to have a greater reach in the communities.

Conclusion

Based on the result of the assessment, the piloting seemed to be a success and farmers field schools appear to be a great channel to reach farmers population and improve their nutrition knowledge, attitude and practices. FFS activities are on-going in several countries of the region and this experience could be used as a reference for the integration of nutrition into FFS. The next steps of this pilot are: the finalization of the guide, development of IEC materials, dissemination of the methodology and advocate for the development of a national strategy for the integration of nutrition into agricultural extension services and FFS in particular.

4.3. Food-Based Dietary Guidelines used by agriculture extension workers: the case of Sierra Leone

Context and justifications:

Despite the long and devastating civil war that Sierra Leone endured (1991-2002), it has made significant progress towards peace building, resettlement of displaced populations, reconstruction of war-affected communities, and rehabilitation of productive household and community assets. However, country is still facing enormous challenges. Poverty, prevalence of endemic infectious diseases, food insecurity and malnutrition are still very high.

According to the State of Food Security and Nutrition in Sierra Leone (2011), the poverty level is very high, 70% of the population living below the national poverty line of US\$2 per day and 26% living in extreme poverty. As for food insecurity, approximately 45% of the country's population is food insecure during the lean season, with 54.1% of food insecure households in rural areas as opposed to 29.1% in urban areas (CFSVA, 2010). Regarding the nutritional status of the children under 5 years 12.9% of the population is underweight, and while 4.7% of children under 5 years are acutely malnourished, 1 % are severely malnourished. Children in rural areas are more affected by acute malnutrition than those in urban areas. 28.8% of children aged six to 59 months are stunted, with 7.8 % severely stunted (Ministry of Health and Sanitation Sierra Leone and UNICEF Sierra Leone, 2014).

Agriculture constitutes an important livelihood source for many poor in Sierra Leone as shown by the fact that two-thirds of the population survives on subsistence agriculture. Agriculture plays a crucial role in ensuring food security, poverty reduction and improving the nutrition of the vulnerable. Approximately 70% of the population in Sierra Leone lives in rural areas, and engages in smallholder agricultural production. Despite the potential to contribute in alleviating malnutrition, many poor rural people are trapped in low-production agriculture, poor health, and poverty. This can be attributed to the fact that improved nutrition is not usually an explicit goal of agricultural production systems and many agricultural policies may have even contributed to declining nutrition and diet diversity for the poor according to the Sierra Leone Food and Nutrition Security Policy Implementation Plan 2012-2016 (Government of Sierra Leone, 2012).

As a result, in 2015 FAO has provided technical support to the Ministry of Agriculture, Forestry and Food Security through the project "Mainstreaming Food and Nutrition Security and the Right to Food into the Smallholder Commercialization Programme". One of the main outputs of this project was the development of a food based dietary guidelines (FBDG) and a module on food and nutrition security (FNS) in the FFS manual that was adapted from a similar one previously developed by FAO for Mozambique. The module will be analyzed in the section five of the report. This section will focus on the processes leading to the development of the FBDG and training module, and its implementation.

This case study is presenting the experience of Sierra Leone, where FBDG has been used to develop training materials to integrate nutrition into agricultural extension service. The case is organized as follows: the first section explains FBDG, what it is and the reason of its importance; the second one, emphasizes on the key steps used to develop the country FBDG based on FAO/WHO framework; and finally, the lessons learnt are stated.

Understand Food-Based Dietary Guidelines

FBDGs are a set of easily understandable messages for the general public that are country-specific and take into account each country's food availability, dietary patterns and nutrition-related health issues. They are evidence-based, consumer-centered and they should be understandable, affordable and environmentally sustainable. They should also form the basis for public food and nutrition, health and agricultural policies, and nutrition education programmes to foster healthy eating habits and lifestyles.

They are important because they are used as advocacy tool to influence national policy. At international level, they can help ensure that national programmes and policies are aimed towards fulfilling the Sustainable Development Goals, such as goal 3: "Ensure healthy lives and promote well-being for all at all ages", and goal 12: "Sustainable consumption and production patterns". Furthermore, developing FBDG are one action point of the ICN2 Framework for Action: "implement nutrition education and information interventions based on national dietary guidelines and coherent policies related to food and diets, through improved school curricula, nutrition education in health, agriculture and social protection services, community interventions, and point-of-sale information, including labelling".

Development of the FBDG

Developing the Sierra Leone food based dietary guidelines relied on the FAO/WHO process. The key steps of the framework are presented and explained in the following paragraphs.

The first step, consisted of setting up a multidisciplinary working group (WG) that included experts from various sectors, especially:

- Ministry of Agriculture, Forestry and Food Security (MAFFS)
- Ministry of Health and Sanitation (MOHS)
- Ministry of Education, Science and Technology
- UN agencies (WHO, UNICEF, WFP)
- Njala University
- INGOs and NGOS (SNAP, HKI, WHH, Focus 1000)
- SUN Secretariat

The role and the responsibilities of the WG were to confirm the terms of reference of the FBDG, to identify and develop the content of the guidelines in order to ensure its relevance and appropriateness to the needs of the country, and to validate the messages to ensure that they address the actual nutrition-related health problems of the country.

The second step, was related to the identification and description of nutrition-related public health problems. The WG had to prioritize problems that could be influenced by nutrition (taking into account that other factors could also contribute), and describe the country's health burden. They agreed that the following problems should be addressed in the FBDG:

- undernutrition (particularly stunting),
- micronutrient deficiency focusing on iron deficiency and vitamin A deficiency,
- overweight,
- non-communicable diseases,

- infectious diseases.

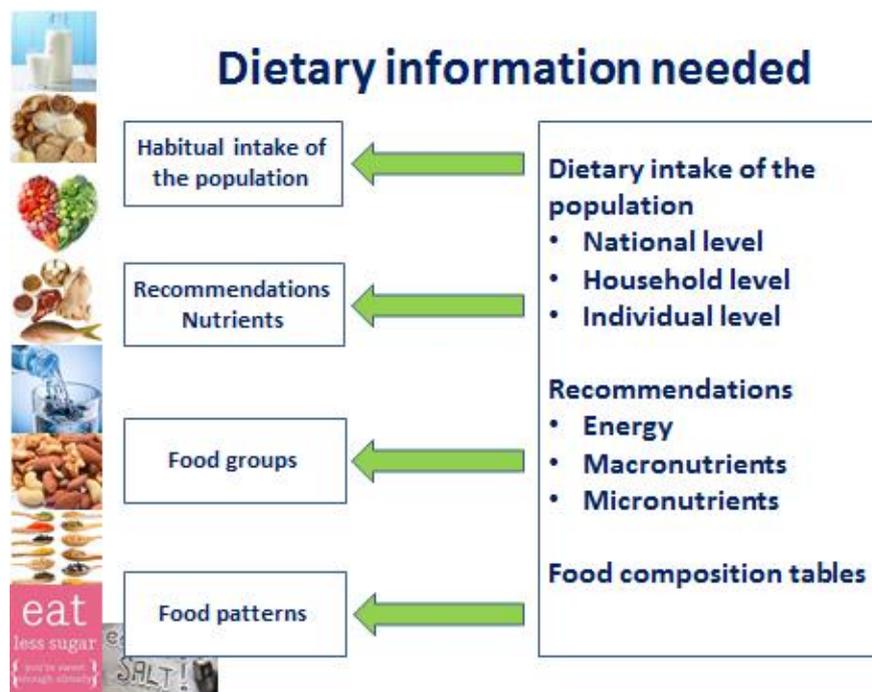
The above to be positioned in the context of healthy eating for families

The third step, was about identifying and reviewing the national policies and programmes that should have included a nutrition education component in their implementation but did not. The documents reviewed included:

- The National Food and Nutrition Security Implementation Plan
- The National Agenda for Prosperity – A4P
- The draft National Infant and Young Child Feeding Strategy
- The school curriculum; Home Economic syllabus
- The university curriculum – Institute of Home Sciences

During the step 4, the WG revised the food composition and the dietary patterns of Sierra Leone by: 1) comparing habitual food and nutrients intake of the population with recommendations, anthropometric and biochemical data and activity data, 2) identifying food groups, and 3) food patterns (Figure 1).

Figure 10 : Dietary information needed for FBDG



Source: (Wentzel-Viljoen, 2016)

Attention should be drawn on the fact that data is not always available for all the points mentioned above. Very often, there is a need to adapt and work with the available data either from neighboring countries, or from sub-region/regional level. For instance, a country may not have national (nor household, nor individual) dietary data available. In this case the WG can decide to use alternative options like conducting individual dietary surveys (IDS)¹⁸, using food

¹⁸ Individual dietary survey such as: 24-hour recalls, food frequency questionnaire, quantitative food frequency questionnaire, rapid surveys from food centres, rapid food security and nutrition assessment, etc.

balance sheet data (FBS)¹⁹, or household budget survey data (HBS)²⁰. Each of these alternative methods presents advantages and disadvantages. Therefore, the method that best suits the needs of the country, also considering the constraints the working group might be facing, should be chosen. Likewise, the country might not have national dietary recommendations intake (RDI) or food composition tables (FCT). Fortunately, for those two databases, the WG can decide to use RDI or FCT of countries with similar food intake. Regarding the FCT there are: The International Network of Food Data Systems (INFOODS)²¹, or the regional food composition tables²² available. The WG could also use scientific articles as an option.

In the particular case of Sierra Leone, the West Africa Food Composition Table was used. Individual Dietary Surveys were conducted and most of the WG members were Sierra Leone's nationals, which ensured that they were aware of people food choices and consumption patterns.

The WG concluded for this step that fish is the most commonly consumed food from animal source; even though, the consumption for some people needs to be increased and the distribution among family members is not equal. There are a variety of starchy foods available in the country (grains, tubers, roots, etc). There is a need to promote additional grains, (e.g. millet) and to favour unpolished rice. Similarly, vegetables and fruits are widely available and are often for sale at roadside, but the consumption and the portion sizes per person need to be increased. The cooking method and duration of vegetables and green leaves must be corrected in order to gain more nutritional benefit. On the other hands, legumes as well as nuts and seeds consumption levels are good and should be maintain; even if nutrient dense nuts and seeds should be promoted. It has been found by the WG that oil and palm oil in particular which is locally produced is well consumed especially by the oil producers themselves. Lastly, it has also been pointed out that the Sierra Leoneans usually eat in family. After having identified the dietary patterns, it is necessary to confirm the patterns with health problems identified in step 2. The table below is an illustration of a health problem related to a diet pattern.

¹⁹ Food balance sheet data gives the energy, the protein and the fat intake per person per day. It is available at: <http://faostat.fao.org/site/368/default.aspx#ancor>

²⁰ The household budget survey analyses the family expenditure.

²¹ Available at: <http://www.fao.org/infoods/infoods/en/>

²² The West Africa Food composition table is available at: <http://www.fao.org/docrep/015/i2698b/i2698b00.pdf>

Table 8 : Confirm health and diet relationship

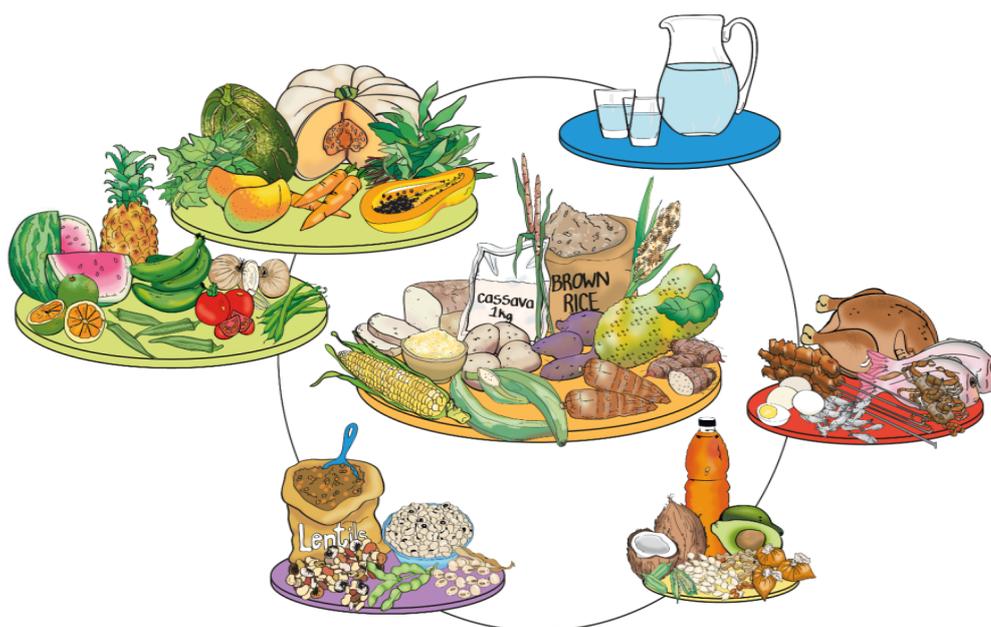
Public health problem	Nutrients / foods / diet pattern	Other risk factors / causes
Stunting	Lack of breastfeeding Inadequate IYCF	Lack of hygiene Lack of care Lack of health care
Vitamin A deficiency	Lack of breastfeeding Inadequate IYCF No / small portions leaves and vegetables	High parity Frequent infections Lack of immunisation
Type 2 diabetes	High energy intake High total fat intake Whole grains, nuts legumes protective	Aging Overweight Inactivity Undernutrition in utero
Tuberculosis	Adequate macro and micronutrients to prevent and treat	Undernutrition and diabetes increase risk

Source: (Browne, 2016)

This step is probably the most critical due to the lack of country specific available data.

During step 5, the WG went to a retreat to draft the food groups (figure 6) and the nutrition messages based on the nutrition-related health problems and the dietary patterns identified.

Figure 11 : Sierra Leone Food groups



Source: (Koroma, 2016)

Sierra Leone has now 7 food groups identified as follow:

- Rice, cassava, other whole grains, roots, tubers
- Fruit, vegetables, green leaves
- Beans, peas, lentils, soya
- Fish, poultry, meat, milk, eggs
- Oil, nuts, seeds
- *Iodized salt
- *Sugar
- **Water
- (* salt and sugar are not illustrated on the food guide as they are not food groups, and overconsumption must not be promoted)
- (** Water is illustrated on the Food Guide although it is not a food group, as consumption is essential and education on safe water will be done using the food guide)

The WG developed eight nutrition-related health message for the general public:

1. Eat either fish, poultry, meat, milk and eggs every day
2. Eat rice, cassava, or other whole grains, roots and tubers as part of meals
3. Eat plenty of fruit, vegetable and green leaves at every meal
4. Eat beans, peas and lentils every day
5. Use oil in moderation and eat seeds and nuts
6. Use iodized salt, but use it in moderation
7. Use sugars and foods and drinks made with sugar in moderation
8. Take 8 – 10 glasses of safe water daily

Applying all the eight required messages is not enough to ensure healthy diets; improving nutritional outcomes requires to take into account the contribution of other sectors. Hence, additional set of messages that promotes healthy lifestyle were also formulated by the WG as follows:

1. Protect the quality and safety of your food
2. Wash your hands before cooking, eating and feeding children
3. Be physically active
4. Keep your environment clean
5. Clean your teeth and mouth twice a day
6. Remember that tooth brushes should be changed 3-4 times in a year
7. Fluoride should be used sparingly in little children i.e. no more than a pea sized drop on the toothbrush. Too much fluoride at this age leads to white spots on the tooth
8. Almost all tooth decay can be prevented with oral hygiene and good nutrition. This will lead to a lifetime of healthy teeth and thus stop the costly and worrisome stress and pain in a lifetime.

Consumer research was conducted by Helen Keller International (HKI) to test the understanding of the food groups and the messages. The research was composed of focus group discussions with people responsible for most of the households' food purchase and cooking. The results of the research showed that participants understood the proposed messages and were positive about making changes themselves. However, they mentioned

that major barrier to the implementation of the messages would be the availability and affordability of the foods.

Step 6, was about the initial implementation and communication plan. The communication strategy was targeting four main groups: a) those who already communicate nutrition (i.e. pre and post service nurse); b) those who can include nutrition messages (i.e. agriculture extension workers); c) those who should, but usually do not do nutrition education (i.e primary and secondary schools and universities), and finally, d) small and mass-media. To disseminate the FBDG to those groups it was essential to develop educational materials. Consequently, a food and nutrition security modules were developed to be incorporated in the FFS manual for extension workers of the Smallholder Commercialization Programme – Global Agriculture and Food Security Programme. The module is analysed in Section 6 of this report. A series of trainings on the FBDG for health and nutrition professionals and home economics teachers are currently being carried out.

To roll-out the FBDG in Sierra Leone, more activities are needed. First of all, the national and district high level official launching and dissemination of the FBDG need to be organized. Advocacy for resource allocation, the development of FBDG's information education and communication (IEC) materials and strengthening the human resources for the implementation are other activities that are yet to be realized. Ensuring effective coordination mechanism through the SUN movement and the full implementation of the FBDG with extension officers, schools and universities are decisive steps for the guidelines not to be left in stores but reflected in all homes across the country. Eventually, a functional monitoring and evaluation system and implementation matrix for FBDG must be developed.

Lessons learnt

The lessons learnt from this experience are:

- FBDG must be evidence-based, realistic, affordable and attainable;
- A working group or task force should identify where to find useful national food and dietary data/information for the preparation of the FBDG. It is important to use what is available in the country and know where to look for missing data or alternatives. The working group or the task force should remember to be practical;
- The development process must be carried-out by a multidisciplinary team to address all nutrition-related health problems of the country, (that we know multi-sectoral) and also ensure appropriateness of the FBDG by all sectors.
- Healthy behavior messages that are not directly nutrition related could/should be promote in the FBDG to emphasize on the importance of a comprehensive approach.
- The design of education materials is important to disseminate the FBDG to different actors such as health extension workers, agricultural extension workers, community agents, primary and secondary schools and universities, etc.

Conclusion

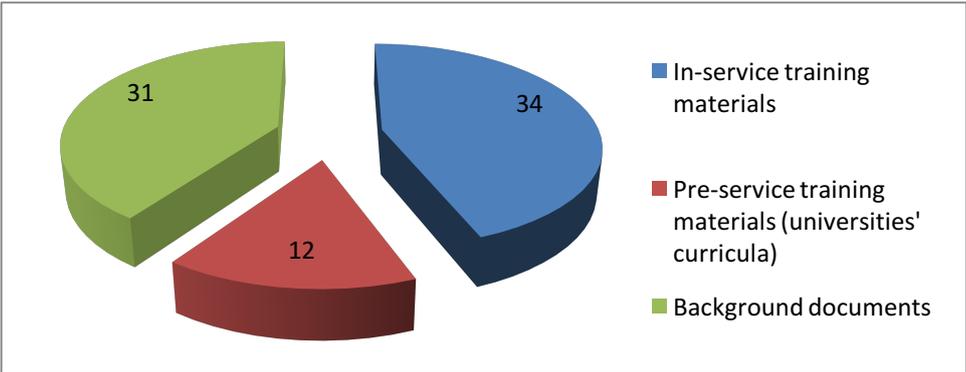
The Sierra Leone case shows that FBDGs could be an interesting entry-point to incorporate nutrition in agriculture extension services. It allows attaining two goals with one activity: support a member country to develop their national FBDGs and strengthen agricultural extension

service as recommended in the ICN2 framework for action. Unfortunately, in the Sub-Saharan Africa region only Benin, Namibia, Nigeria, Seychelles, Sierra Leone and South Africa have developed their FBDGs. FAO has recently actively re-engaged in technical support to member countries (that were already working in a process of developing their FBDGs) to develop, revise and implement FBDGs in line with current scientific evidence and country specific health, food and nutrition needs. In May 2016, a technical consultation meeting was organized in South Africa with representatives from 12 English-speaking African countries (Botswana, Cameroon, Gambia, Ghana, Kenya, Malawi, Namibia, Rwanda, Swaziland, United Republic of Tanzania, Zambia and Zimbabwe) to develop and implement FBDGs. A similar consultation will be organized with 11 Francophone African countries in November 2016 (Burkina Faso, Burundi, Central Africa Republic, Chad, Congo, Democratic Republic of Congo, Gabon, Mali, Mauritania, Niger and Senegal). Throughout the process, a key aspect is not just having national FBDGs, but implementing them within existing national initiatives (i.e. food, nutrition, agriculture, social protection and health initiatives), accompanied by effective Monitoring and evaluation strategies.

5. KEY FINDINGS ON THE REVIEW OF TRAINING MANUALS FOR AGRICULTURAL EXTENSION AND ADVISORY SERVICE IN AFRICA

The desk review resulted in 34 relevant training materials mainly shared through FAO nutrition focal points, while ENACT/ ENAF university partners were used as an entry-point to collect curricula of agricultural extension programmes in universities where it exists. Eleven curricula from eight universities in five countries were collected.

Figure 12 : Distribution of literature according to their categories



5.1. In-service training manuals

Table 9 shows the results of the analysis of the in-service training materials.

Table 9 : Results of the analysis of the in-service training materials

Descriptive information				Step 1: Dev. process	Step 2: Identif. of target group	Step 3: Message on the content	Step 4: Pedagogical approach			Step 5: Evaluation		Score
Title	Author	Country	Year	Form. research	Target group	Topics	Easy to understand Vs. technical	Non-formal Vs. formal education approach	Explanations on how to conduct non- formal education activities	Evidence on impact on dietary practices/nut rition outcomes	Field- testing	
Manuel des Animateurs de « Farmer Field Schools » sur L'aviculture Villageoise à Petite Echelle	- Charlotte Vesterlund McAinsh, - Jens Christian Riise - Network for Small holder Poultry Development	Democratic Republic of the Congo	2005	(0)	(1)	0.5-	(1)	(1)	(0)	(0)	(0)	3.5-
Nutrition Sensitive Agriculture Farmer Training	- ACIDI/VOCA	Ethiopia	n/d	(1)	(1)	(0.5)-	(1)	(1)	(0)	(0)	(0)	4.5
Agricultural Development Agents Training Manual Linking Agriculture and Nutrition For Healthy and Strong Ethiopian families	- Hawassa University, Ethiopia - Centre for Development Innovation, Wageningen UR, The Netherlands	Ethiopia	2015	(0)	(1)	(0.5)	(1)	(1)	(1)	(0)	(0)	4.5

Step 1 – Formative research conducted : yes (1) or no (0) ; Step 2 – Target audience identified : yes (1) or no (0) ; Step 3 – Message content : everything (1), partially (0.5)-, (0.5), (0.5) +, (0.5) ++, or no (0) ; Step 4 – Message form and delivery: Easy to understand (1) or technical (0); Participatory (1) or top-down (0); Explanations on how to conduct non-formal education activities: yes (1) or no (0) – Step 5 – Impact assessment : yes (1) or no (0); Pre-testing: yes (1) or no (0).

Agricultural Development Agents Facilitators Manual Linking Agriculture and Nutrition For Healthy and Strong Ethiopian families	- Hawassa University, Ethiopia - Centre for Development Innovation, Wageningen UR, The Netherlands	Ethiopia	2015	(0)	(1)	(0.5)	(1)	(1)	(1)	(0)	(0)	4.5
Nutrition-Sensitive Agriculture Participant Manual for Agriculture Development Agents	- USAID-ENGINE - Save the Children	Ethiopia	2012	(0)	(1)	(0.5)	(0)	(0)	(0)	(0)	(0)	1.5
Nutrition-Sensitive Agriculture Trainer Manual for Agriculture Development Agents	- USAID-ENGINE - Save the Children	Ethiopia	2012	(0)	(1)	(0.5)	(0)	(1)	(1)	(0)	(0)	3.5
Nutrition Education Training for Agriculture Extension Officers - Training session and resources	- USAID - IYCN	Ethiopia	2011	(0)	(0)	(0.5)	(1)	(1)	(1)	(0)	(0)	3.5

SURE programme job aids For health and agriculture extension workers	- Ethiopian Public Health Institute - London School of Hygiene and Tropical Medicine, UK	Ethiopia	n/d	(0)	(1)	(0.5)++	(1)	(1)	(0)	(0)	(0)	3.5++
SURE Training manual for Health and Agriculture Development Armies	- Ministry of Health - Ministry of Agriculture Federal Democratic Republic of Ethiopia	Ethiopia	2015	(0)	(1)	(0.5)++	(0)	(0)	(0)	(0)	(0)	1.5++
Nutrition Program Planning and Supervision for Health and Agriculture Program Managers - Learner's Guide	- USAID-ENGINE - JHPIEGO - Save the Children	Ethiopia	2013	(0)	(1)	(0.5)-	(0)	(0)	(0)	(0)	(0)	1.5-
Improving Nutrition through Diversified Foods Production and Utilization - Course Reference Manual	- USAID-ENGINE - JHPIEGO - Save the Children	Ethiopia	n/d	(0)	(1)	(0.5)-	(0)	(0)	(0)	(0)	(0)	1.5-
Applied Basic Agri-Nutrition Resource Toolkit for Trainers	- Ministry of Agriculture - Ministry of Public Health and Sanitation	Kenya	2013	(0)	(1)	(0.5)-	(0)	(0)	(0)	(0)	(0)	1.5-

Applied Basic Agri-Nutrition Resource Manual for Trainers	- Ministry of Agriculture - Ministry of Public Health and Sanitation	Kenya	2013	(0)	(1)	(0.5)-	(0)	(0)	(0)	(0)	(0)	1.5-
Nutrition Handbook for farmer Field Schools	- Ministry of Agriculture, Irrigation and Water Development - Department of Agriculture Extension Services (DAES), Nutrition Unit	Malawi	2015	(0)	(1)	(0.5)-	(1)	(0)	(0)	(0)	(0)	2.5-
Guide des pratiques d'alimentation et de nutrition communautaire - Manuel du formateur (DRAFT)	- Fatoumata Konate FAO	Mali	2015	(0)	(0)	(0.5)++	(0)	(1)	(0)	(0)	(0)	1.5++
Nutrition Training Pack Farmer Field Schools - Part 1 : Trainers of facilitators (DRAFT)	- Carol Browne	Mozambique	2013	(0)	(1)	(0.5)-	(1)	(1)	(0)	(0)	(0)	3.5-
Nutrition Training Pack Farmer Field Schools - Part 2 : Facilitators Guidelines (DRAFT)	- Carol Browne	Mozambique	2013	(0)	(1)	(0.5)-	(1)	(1)	(0)	(0)	(0)	3.5-

Food and Nutrition A Handbook for Namibian Volunteer Leaders	- FAO	Namibia	2004	(0)	(1)	(0.5)-	(1)	(1)	(0)	(0)	(0)	3.5-
Agriculture Extension Workers Nutrition Guide (DRAFT)	- Komlan Kwadjode - Adama Diouf FAO	Senegal	2015	(1)	(0)	(0.5)++	(1)	(1)	(0)	(1)	(1)	5.5 ++
Module 10: Food and Nutrition security	- Carol Browne - FAO	Sierra Leone	2016	(1)	(1)	(0.5)-	(1)	(1)	(1)	(0)	(1)	5.5-
Food and Nutrition Handbook for Extension Workers	- Ministry of Agriculture , Animal Industry and Fisheries - Government of Uganda	Uganda	2015	(0)	(1)	(1)	(0)	(0)	(0)	(0)	(0)	2
Family Nutrition Guide	- Ann Burgess - Peter Glasauer FAO	Worldwide	2004	(0)	(1)	(0.5)-	(0)	(0)	(0)	(0)	(0)	1.5-
Essential Nutrition Actions and Essential Hygiene Actions Reference Materials on Key Practices: Community Workers	- Guyon A. - Quinn V. - Nielsen J. - Stone Jimenez Core Group	Worldwide	2015	(0)	(0)	(0.5)+	(1)	(0)	(0)	(0)	(0)	1.5+

Essential Nutrition Actions and Essential Hygiene Actions - Training guide: Community Workers	- Guyon A. - Quinn V. - Nielsen J. - Stone Jimenez Core Group	Worldwide	2015	(0)	(1)	(0.5)	(1)	(1)	(1)	(0)	(0)	4.5
Pastoralist Field Schools Training of facilitators Manual	- FAO	Worldwide	2013	(0)	(1)	(0.5)+	(0)	(1)	(1)	(0)	(0)	3.5+
Healthy Harvest - A training manual for community workers in growing, preparing and processing nutritious food	- FAO	Zimbabwe	2015	(0)	(1)	(0.5)	(1)	(1)	(1)	(0)	(0)	4.5
<i>Module sur l'approche Champ ecole Paysan</i>	- FAO	<i>Burundi</i>	<i>2014</i>	<i>(0)</i>	<i>(0)</i>	<i>(0)</i>	<i>(1)</i>	<i>(0)</i>	<i>(0)</i>	<i>(0)</i>	<i>(0)</i>	<i>1</i>
<i>Farmer Field School Implementation Guide Farm forestry and livelihood development</i>	<i>Takayuki Hagiwara, Shinji Ogawa, Patrick M. Kariuki, Jane N. Ndeti, James M. Kimondo, Organizations: FAO, JICA, KFS</i>	<i>Kenya Burkina Faso</i>	<i>2011</i>	<i>(0)</i>	<i>(1)</i>	<i>(0)</i>	<i>(0)</i>	<i>(0)</i>	<i>(1)</i>	<i>(0)</i>	<i>(0)</i>	<i>2</i>

<i>Guide de formation à l'usage des Facilitateurs des Champs Ecoles Paysans (CEP)</i>	<i>Célestin Koko Nzeza</i>	<i>Niger</i>	<i>2006</i>	<i>(0)</i>	<i>(0)</i>	<i>(0)</i>	<i>(1)</i>	<i>(0)</i>	<i>(0)</i>	<i>(0)</i>	<i>(0)</i>	<i>1</i>
<i>Guide Pratique à l'Usage des Facilitateurs pour les activités de Champs école paysans</i>	<i>Bassirou Amadou</i>	<i>Niger</i>	<i>2009</i>	<i>(0)</i>	<i>(1)</i>	<i>(0)</i>	<i>(0)</i>	<i>(0)</i>	<i>(0)</i>	<i>(0)</i>	<i>(0)</i>	<i>1</i>
<i>Conducting Farmer Field School - Facilitators guide</i>	<i>- FAO</i>	<i>Worldwide</i>	<i>2014</i>	<i>(0)</i>	<i>(1)</i>	<i>(0)</i>	<i>(1)</i>	<i>(1)</i>	<i>(0)</i>	<i>(0)</i>	<i>(0)</i>	<i>3</i>
<i>Champs ecoles paysans d'elevage ligne de conduite pour le manuel de facilitation et le manuel technique</i>	<i>- Kim Groeneweg - Gertrude Buyu - Dannie Romney - Bruno Minjauw ILRI</i>	<i>Worldwide</i>	<i>2005</i>	<i>(0)</i>	<i>(0)</i>	<i>(0.5)</i>	<i>(0)</i>	<i>(1)</i>	<i>(1)</i>	<i>(0)</i>	<i>(1)</i>	<i>3.5</i>
<i>Pastoral Field School - Guidelines for facilitations</i>	<i>- FAO</i>	<i>Worldwide</i>	<i>2009</i>	<i>(0)</i>	<i>(1)</i>	<i>(0.5)</i>	<i>(1)</i>	<i>(1)</i>	<i>(1)</i>	<i>(0)</i>	<i>(0)</i>	<i>4.5</i>
<i>Getting Started running Junior Farmer Field and Life School</i>	<i>- FAO and WFP</i>	<i>Worldwide</i>	<i>2007</i>	<i>(0)</i>	<i>(0)</i>	<i>(0)</i>	<i>(1)</i>	<i>(0)</i>	<i>(0)</i>	<i>(0)</i>	<i>(0)</i>	<i>1</i>

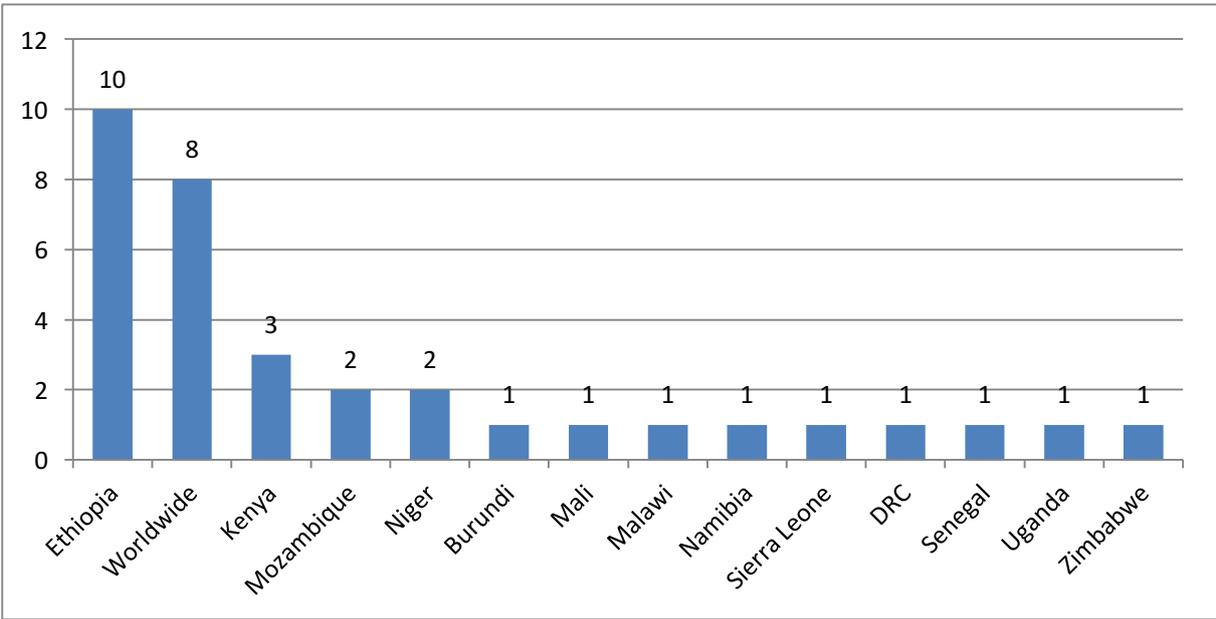
The training materials were analysed following the conceptual framework presented in Section 2. Before going into details in the analysis of each step, there are some general remarks that can be highlighted.

First, among the materials there are subgroups that could be distinguished: (i) the materials that focus on technical content (crop, livestock, health etc.) and (ii) the guides on how to conduct a FFS, AFS, or JFFLS. The later emphasizes on the process and steps required to implement a FFS rather than on technical aspects. These guides have been gathered at the end of the table (in italic) not to bias the results. Indeed, all of those in italic have scored 0 on Step 3. Nevertheless, it is important to note that the *Pastoral Field School - Guidelines for facilitations* published by FAO in 2009 is an exception.

The second remark is that most of the pastoralist guides analysed have the particularity of focusing solely on livestock. Very few address the question of crop or horticulture; when it does, it is often in order to feed the livestock. As mentioned above, the exception is *Pastoral Field School - Guidelines for facilitations*.

Thirdly, the number of materials from Ethiopia: it stands out from the table 9 that Ethiopia has produced many training materials for their DAs, HDAs, and ADAs. Figure 13 summarizes the number of materials collected in the review for each country and worldwide (Figure 13).

Figure 13 : Distribution of the training materials collected by country



Finally, the absence of clearly stipulated information in the training material regarding the conduct of a formative research, an identified target group and an evaluation and pre-testing for the materials resulted in score 0. In other words, all these elements could have been done, but because they were not mentioned in the material and we were not aware of their existence, the opposite was assumed.

Step 1 – Problem identification

Identifying the specific nutritional and agricultural main issues of a country is crucial to develop sustainable and effective interventions. When developing a training manual, it is important to mention the results of the formative research to justify its content and validate it for a specific time and place. For instance, the problems identified in Chad today, might not be the exact same of those experienced in Lesotho 5 years ago. Some countries could decide to highlight on overweight and obesity while other would focus on consumption of iron rich-food. The formative research helps make the agricultural EAWs' training country and timeframe specific.

Out of the 34 materials revised, only three carried-out a formative research, but only one mentioned it in the guide: *Nutrition Sensitive Agriculture Farmer Training* developed by ACIDI/VOCA in Ethiopia. The two others are the draft version of the Senegal guide and the Sierra Leone module, respectively: *Agriculture Extension Workers Nutrition Guide* and *Module 10: Food and Nutrition security*.

Step 2 – Target audience

Defining the target audience is also an important exercise that most of the designers of the materials seem to have understood. 25 materials clearly stipulated their target audiences which encompass: lead farmers, development agents, master trainers, health development agents and agricultural development agents in Ethiopia, trainers in Kenya, facilitators and participants of FFS in Mozambique or farmers in Malawi. There are still seven materials that didn't clearly identify their target group (one training manual from Ethiopia, the manuals from Mali and Senegal and four worldwide).

Step 3 – Message content

The messages in the training manuals vary a lot from one country to another, but is quite similar within the materials produced within a country. As mentioned earlier in Step 1, it is not expected for all materials to have the same content or core messages, since they are supposed to be country and timeframe specific. Nevertheless, the core messages should ideally cover the main stages of the food chain (crop, livestock, food processing, consumption with food safety, hygiene and gender considerations along the chain). In other words, even if a country identifies its priority areas that should receive attention, it is essential to keep in perspective the food system as a whole in order to break the "silos effect".

Among the materials analysed, only the draft version of the Senegalese Agriculture Extension Workers Nutrition Guide covered the 6 topics identified in the conceptual framework (horticulture and crops; livestock and fisheries; food processing, fortification and storage; hygiene; consumption and gender-sensitivity). Four materials covered five topics, two covered four, nine covered three and eleven covered less than three topics.

It has been noticed that the gender topic is not covered as a stand-alone topic. It is often covered when raising the issue of nutrition through life cycle. As mentioned earlier in the section, manuals on pastoralism tend to focus only on pastoralist activities, and manual on how to conduct FFS, AFS, JFFLS don't deliver message on technical issues. Also, many manuals are health oriented; instead of integrating nutrition into agriculture, they rather tend to

integrate agriculture into nutrition (e.g. *Applied Basic Agri-Nutrition Resource Manual for Trainers from Kenya*, or the *Nutrition Education Training for Agriculture Extension Officers - Training session and resources* from Ethiopia, or the *Food and Nutrition Handbook for Extension Workers* from Uganda).

Step 4 – Message form and delivery

Easy to understand or technical – In general materials were easy to understand, only few were considered too technical for the target audience.

Participatory or top-down – There are still too many manuals that adopt a formal education approach. More than 40% of the material consulted were not using a non-formal education approach (15 out of 36).

Explanations on how to conduct non-formal education activities – Interestingly enough, only 30 % of the materials had a section on the importance of animation techniques (11 manuals). Some manuals have notes at the end of each sessions on how to conduct participatory activities, such as the guide developed by Zimbabwe and Sierra Leone.

Step 5 – Evaluation

According to the data analysed, evaluation seems to be the most neglected part of the development process. In none of the consulted materials information on assessment of the impact of the implementation of the training guide was mentioned. It seemed like only Senegal have conducted an evaluation, but this was found out thanks to the field mission and wasn't mention in the material. This could probably be the case for other countries as well.

A similar remark is made for the pre-testing. Only the *Champs écoles paysans d'élevage ligne de conduite pour le manuel de facilitation et le manuel technique* developed by ILRI stated to have conducted a pre-test of the material. Senegal and Sierra Leone pre-test was found out thanks to field missions and discussions.

The figure 14, summarized the number of materials that fulfilled the steps.

Figure 14 : Number of materials that fulfilled each step

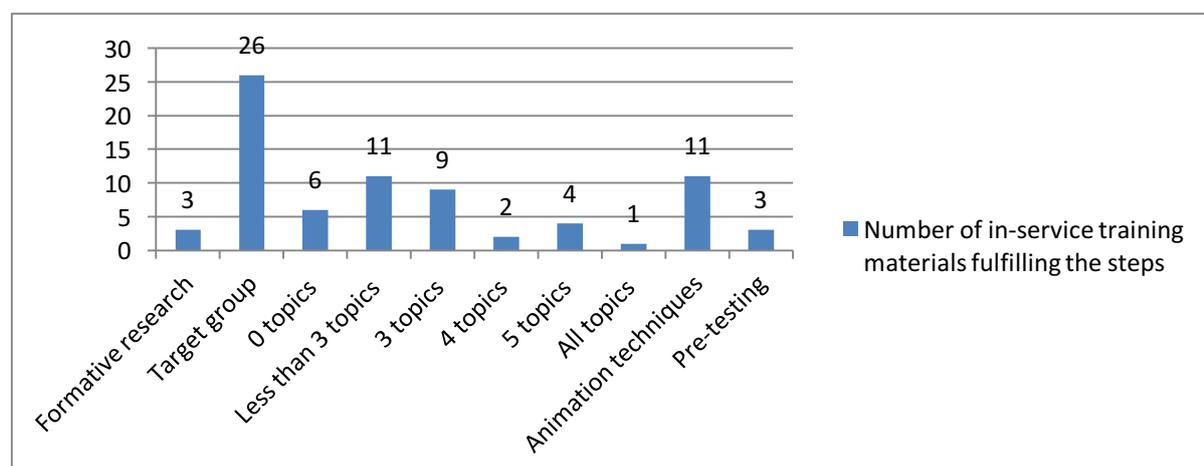


Table 10 : Classified materials according to their score²³

The table 10, classify all the materials, excluding those on the conduct of FFS, AFS and JFFLS, according to the score they got.

²³ The table excluded the manuals on how to conduct a FFS, AFS and JFFLS

	Title	Author	Country	Score
1	Agriculture Extension Workers Nutrition Guide (DRAFT)	- Komlan Kwadjode - Adama Diouf FAO	Senegal	5.5 ++
2	Module 10: Food and Nutrition security	- Carol Browne - FAO	Sierra Leone	5.5-
3	Nutrition Sensitive Agriculture Farmer Training	- ACDI/VOCA	Ethiopia	4.5
4	Agricultural Development Agents Training Manual Linking Agriculture and Nutrition For Healthy and Strong Ethiopian families	- Hawassa University, Ethiopia - Centre for Development Innovation, Wageningen UR, The Netherlands	Ethiopia	4.5
5	Agricultural Development Agents Facilitators Manual Linking Agriculture and Nutrition For Healthy and Strong Ethiopian families	- Hawassa University, Ethiopia - Centre for Development Innovation, Wageningen UR, The Netherlands	Ethiopia	4.5
6	Essential Nutrition Actions and Essential Hygiene Actions - Training guide: Community Workers	- Guyon A. - Quinn V. - Nielsen J. - Stone Jimenez Core Group	Worldwide	4.5
7	Healthy Harvest - A training manual for community workers in growing, preparing and processing nutritious food	- FAO	Zimbabwe	4.5
8	SURE programme job aids For health and agriculture extension workers	- Ethiopian Public Health Institute - London School of Hygiene and Tropical Medicine, UK	Ethiopia	3.5++
9	Pastoralist Field Schools Training of facilitators Manual	- FAO	Worldwide	3.5+
10	Nutrition-Sensitive Agriculture Trainer Manual for Agriculture Development Agents	- USAID-ENGINE - Save the Children	Ethiopia	3.5
11	Nutrition Education Training for Agriculture Extension Officers - Training session and resources	- USAID - IYCN	Ethiopia	3.5
12	Manuel des Animateurs de « Farmer Field Schools » sur L'aviculture Villageoise à Petite Echelle	- Charlotte Vesterlund McAinsh, - Jens Christian Riise - Network for Small holder Poultry Development	Democratic Republic of the Congo	3.5-
13	Nutrition Training Pack Farmer Field Schools - Part 1: Trainers of facilitators (DRAFT)	- Carol Browne	Mozambique	3.5-
14	Nutrition Training Pack Farmer Field Schools - Part 2: Facilitators Guidelines (DRAFT)	- Carol Browne	Mozambique	3.5-
15	Food and Nutrition A Handbook for Namibian Volunteer Leaders	- FAO	Namibia	3.5-
16	Nutrition Handbook for farmer Field Schools	- Ministry of Agriculture, Irrigation and Water Development - Department of Agriculture Extension Services (DAES), Nutrition Unit	Malawi	2.5-
17	Food and Nutrition Handbook for Extension Workers	- Ministry of Agriculture, Animal Industry and Fisheries - Government of Uganda	Uganda	2
18	SURE Training manual for Health and Agriculture Development Armies	- Ministry of Health - Ministry of Agriculture Federal Democratic Republic of Ethiopia	Ethiopia	1.5++
19	Guide des pratiques d'alimentation et de nutrition communautaire - Manuel du formateur (DRAFT)	- Fatoumata Konate FAO	Mali	1.5++

20	Essential Nutrition Actions and Essential Hygiene Actions Reference Materials on Key Practices: Community Workers	- Guyon A. - Quinn V. - Nielsen J. - Stone Jimenez Core Group	Worldwide	1.5+
21	Nutrition-Sensitive Agriculture Participant Manual for Agriculture Development Agents	- USAID-ENGINE - Save the Children	Ethiopia	1.5
22	Nutrition Program Planning and Supervision for Health and Agriculture Program Managers - Learner's Guide	- USAID-ENGINE - JHPIEGO - Save the Children	Ethiopia	1.5-
23	Improving Nutrition through Diversified Foods Production and Utilization - Course Reference Manual	- USAID-ENGINE - JHPIEGO - Save the Children	Ethiopia	1.5-
24	Applied Basic Agri-Nutrition Resource Toolkit for Trainers	- Ministry of Agriculture - Ministry of Public Health and Sanitation	Kenya	1.5-
25	Applied Basic Agri-Nutrition Resource Manual for Trainers	- Ministry of Agriculture - Ministry of Public Health and Sanitation	Kenya	1.5-
26	Family Nutrition Guide	- Ann Burgess - Peter Glasauer FAO	Worldwide	1.5-

5.2. Pre-service: review of agricultural EAS curricula

Thanks to the ENACT/ENAF partners, twelve agricultural extension and advisory service curricula from Burkina Faso, Ethiopia, Ghana, Kenya, The Niger and Nigeria were received.

In most curricula, there were neither food security, nor human nutrition or home economics nor nutrition education courses, but in four programmes they had nutrition-related courses.

Hawassa University in Ethiopia offers a Bachelor of Science (B.Sc.) in Rural Development and Agricultural Extension where there is a food sciences and human nutrition class. In Ghana, the agricultural colleges under the umbrella of the Human Resource Directorate of the MoFA offers a family nutrition and cookery course to their two-years certificate students. For their two-year diploma in Agricultural Extension, the University of Cape Coast (Ghana) also has a home economics class where students are introduced to the basic principles of food and nutrition. Finally, the Regional Center of Specialized Education in Agriculture of Aboul Moumouni in Niger offers a course in human nutrition and diet to their bachelor degree students.

The table 11 below, summarized the results and give the name of the course related to nutrition offered for the agricultural EAS programme.

Table 11 : Results of the analysis of the pre-service training curricula

University	Country	Coding
		1 = Food security and human nutrition or Home economics and nutrition education courses 0.5 = food security or human nutrition or home economics or nutrition education course 0 = none of the course
Institute of Rural Development/PUB	Burkina Faso	0
Hawassa University ²⁴	Ethiopia	0
Hawassa University ²⁵	Ethiopia	0.5 (Food Sciences and human nutrition)
Agricultural Colleges of the HR Directorate	Ghana	0.5 (Family nutrition and cookery course)
University of Cape Coast ²⁶	Ghana	0
University of Cape Coast ²⁷	Ghana	0
University of Cape Coast ²⁸	Ghana	0.5 (Home economics I)
University of Development Studies	Ghana	0
University of Ghana	Ghana	0
Kenyatta University	Kenya	0
CRESA Universite Abdoul Moumouni	Niger	0.5 (Human nutrition and diet course)
Michael Opeka University	Nigeria	0

²⁴ For the degree of Bachelor of Science (B.Sc.) in Rural Development and Agricultural Extension

²⁵ For the agricultural value chain-oriented extension training for mid-career extension professionals

²⁶ For the degree of Bachelor of Science in Agricultural Extension and Community Development

²⁷ For the degree of Bachelor of Agricultural Extension

²⁸ For the two-year diploma in Agricultural Extension

RECOMMENDATIONS AND CONCLUSION

Recommendations to mainstream nutrition into agricultural extension and advisory services in Africa

Institutional and organizational level recommendations

1. Creating a supportive environment by garnering a strong political will and commitment on the integration of nutrition into agricultural EAS that will be translated into concrete actions for an effective change in rural communities.
2. Breaking silos and maximizing the opportunities through multi-sectoral coordination and implementation from other sectors that will work in synergies instead of competing. Many sectors could play a role in providing nutritious diet.
3. Approaching agricultural extension and advisory service with a gender-sensitive lens to maximize the impact of household income on nutrition.
4. Promoting the food system approach in agricultural learning institutions for students to have a holistic understanding of the food chain regardless of their specialization.
5. Strengthening the capacity of agricultural EAWs in behavior change communication (BCC), adult learning methods and animation techniques.
6. Monitoring and evaluating to document the effectiveness and impact of agricultural extension services on nutrition outcomes at community level.

Operational level

1. Identifying the major nutritional problems and the main agro-ecosystem challenges by conducting a research on the context analysis to maximize efficacy and reduce negative externalities.
2. Targeting the beneficiaries of the agricultural EAS to design inclusive interventions where the beneficiaries could help define the literacy level of the group and therefore adapt the technical content of messages
3. Making agricultural EAWs knowledgeable of nutrition without making them nutrition expert, but rather nutrition educators by being aware of the nutritional benefits of agriculture-based livelihoods for healthy diets at the household and community level.

Conclusion

The desk review revealed that agricultural extension and advisory service is in perpetual evolution. Since recently, there is a regained interest for agricultural EAS, which explains the numerous ongoing initiatives that are working on mainstreaming nutrition into agricultural extension and advisory service throughout Africa. Different approaches are being used for integrating nutrition within both in-service and pre-service agricultural EAS. For instance, in 2014 USAID started the INGENAES project that aims to improve agricultural livelihoods focusing on strengthening extension and advisory services to empower and engage smallholder farmers, male and female (Agrilinks). The project is assisting Feed The Future missions to strengthen gender and nutrition integration within agricultural extension and advisory services (EAS).

Regarding the incorporation of nutrition into in-service training manuals, there is no one specific model that should fit all situations. That is why it is essential to conduct an inclusive and participatory formative research to understand the specificities of each country and, in some cases, of different communities within a country (even though it could seem obvious).

As far as the pre-service training is concerned, there are as many options of nutrition integration as there are agricultural extension programmes. Contributions from the online discussion on “integrating nutrition into the curricula of agriculture education institutions: Strengthening human capacity to promote nutrition-sensitive agriculture” held on the Global Forum for Food Security and Nutrition highlighted an interesting point: one of the identified challenges was that while it is important to mainstream nutrition into learning institutions curricula in a way to emphasize on the linkages with the food system, attention should be drawn to the nutrition component not to be fragmented and diluted in an agriculture-specific training.

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**Food and Agriculture Organization of the United Nations
Regional Office for Africa**

N.2 Gamel Abdul Nasser Road

P.O. Box GP 1628

Accra, GHANA

+233-30-2610930

fao-raf@fao.org

www.fao.org/africa

For enquiries or further information contact:

Laouratou Dia : Laouratou.Dia@fao.org

Mawuli Sablah : Mawuli.Sablah@fao.org

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